

A
SERIES
OF
ORIGINAL EXPERIMENTS
ON THE
FOOT OF THE LIVING HORSE,
EXHIBITING
THE CHANGES PRODUCED BY SHOEING,
AND
THE CAUSES OF THE APPARENT MYSTERY OF THIS ART.

By BRACY CLARK,
VETERINARY SURGEON, F.L.S. &c.

Naturam Furro expensis usque dum non recurret.

LONDON:
PRINTED FOR THE AUTHOR, AND SOLD AT NO. 17, GILTSPUR STREET;
AND BY SHERWOOD, NEELY, AND JONES, PAT. INOSTER ROW.

1809.



Printed by Richard Taylor and Co., Shoe Lane, London.

PREFACE.

ABOUT seven years ago, whilst pursuing some experiments on the contracted feet of horses, it occurred to me that the causes usually advanced to explain this serious imperfection, were not real; and that, in fact, the accidents, carelessness, idle habits and wanton tricks of the smith, had very little concern in its production. The efficient cause began to appear to me to lie much deeper, and to consist in the very method itself by which the shoe is affixed to the foot.

To establish this opinion by the unerring evidence of experiment, seemed difficult; yet a plan for effecting this purpose suggested itself, and a subject exceedingly well fitted for its application soon offered. I have thus been enabled to place this opinion beyond the reach of doubt. A detail of those experiments will be found in the following pages; and the train of consequences which terminate in the partial destruction of the foot, and proceeding from the continued operation of the same cause.

After having well considered these facts, and reflected on the great obscurity which has prevailed in this branch of veterinary science, I imagined that they might be worthy of the attention of the public, especially as, the cause of this chief defect being discovered, little will remain in the art of shoeing, that does not admit of easy solution. I further hoped that, by doing this, I
might

might unite such efforts, as would crown with success the attempt to remove the evil by introducing shoes of a different construction. The few experiments which I have been able to make lead me to conjecture that it cannot be long ere this will be accomplished. Whatever may be the result in regard to this conjecture, the clear and intelligible exhibition of the cause of so much mischief, cannot be of trifling importance: for men are not likely to endeavour to avoid that, of the danger of which they are not sensible. The present method of shocing was, I apprehend, first introduced about twelve or thirteen hundred years ago, and has continued to this day, without any very material changes in it, and apparently without any suspicions being entertained of the fact which I am about to expose; at least any demonstrative evidence of it, as far as my knowledge extends; the abuses in the practice of this art having chiefly attracted the notice of those who have written on these subjects.

Tenderness before, exists among horses in different degrees so universally, that every man accustomed to riding looks for it, and uses his precautions accordingly: nay, it is regarded as almost natural to the animal; and it is a matter which the *knowing ones in horse-flesh*, as they are sometimes termed, are not displeased with: they pick up a cheap horse that has fallen down, or been sold with loss, on account of his tripping dangerously; one which from his high value they could not otherwise obtain: by severity of biting, and by tormenting him with the whip, or spur, or both, (continually inflicting pain, or supporting the apprehension of it,) they conceal, and overcome as it were, the suffering of his feet, and escape the mischiefs to which others using means less cruel, might be exposed. Such is the system which practice has taught them for rendering useful, horses so mutilated.

In determining these matters by actual experiment, there will be found some novelty, as experiments have not before been introduced into this art ; nor was it even supposed to be susceptible of elucidation by such means ; presumptuous opinions or more frequently sturdy assertion having stood in lieu of these, and materially opposed the progress of this species of knowledge.

I cannot forbear offering a remark in this place respecting the veterinary profession, independent of the subject of shoeing, in order to give encouragement to those that are engaged in it, who may at present find it full of difficulty ; and to the public, who may be inclined to withdraw their support, as if it were a hopeless profession. There is no art, it may be maintained, so perplexed and difficult that, by human industry and research, steadily and properly exerted, cannot be rendered more clear and practicable : to accomplish this, however, time must be allowed. Public institutions in themselves cannot, it is obvious, create knowledge ; they can only afford convenient opportunities for study to those who are disposed to employ them ; and it must still be from individual exertion that improvements will spring. When a few advances have been made beyond the present state, the progress will be probably more rapid, and its service to the horse and to mankind will assuredly be felt. Many disappointments have without doubt arisen from unfounded expectations of relief in desperate and hopeless cases where art could not avail ; and some, not finding their interest served in this respect, have become rancorous enemies to the establishment and the profession. The fruit has been sought before the blossom was unfolded. Still there can be no doubt that if human medicine and surgery have been aided by public establishments, the veterinary art must admit of improvement by the same means.

Many promising young men were engaged in this profession at

the first establishment of the college, who would have succeeded in any of the common occupations of life, but who have sunk under the difficulties of this. The obscurity of some cases, and the irremediable nature of others, with the obstinate opposition of persons interested in the support of darkness, have been so adverse to success, that many have fallen sacrifices to them. Of myself, I may remark, that I have with difficulty persevered under the various discouraging circumstances to which I have been exposed; but having at length surmounted several of them, I shall not be deterred from the exercise of this profession while health and strength remain. Whenever I may think that small advances have been made, I propose to give to the public the result of my enquiries, provided they should meet with a favourable reception, and defray the expenses incurred in printing them.

In concluding these observations, I cannot deny myself the satisfaction of recording, without the usual form and language of a regular dedication, some instances of friendship and assistance, continued with unvarying constancy from the commencement of my professional labours to the present day. The services of these friends, with pleasure I acknowledge, have been most grateful to me. In a particular manner I may mention William Lewis, Esq., distiller, in Holborn, whose friendly recommendations at a period when it was most wanted and felt,—the beginning of my professional career,—were of the utmost advantage. And not less do I feel indebted to the friendship and constant support of my worthy and particular friend Mr. James Kidd, of Brentford, to whom such humble researches as I have been enabled to make have been generally first communicated.

GILTSPUR STREET,

Sept. 20th, 1809.

EXPERIMENTS

ON

THE FOOT OF THE HORSE.

THERE is nothing can retard the advances of any art more than too much apprehension about its mysteries and difficulties. The art of nailing iron to horses' feet for their defence is in itself sufficiently simple ; a view of the process would show it ; the readiness with which those who practise it attain the art, would also evince it.

The consequences entailed by a long continuance of this procedure it is that affects the feet ; and the public, finding defects in their horses' going from causes which were not at once apparent, have acquiesced in the mysterious nature of this art, which we hope to be enabled, in the following pages, to develope sufficiently for every one to have a right apprehension of it.

This tenderness in the fore feet of horses, and especially in the saddle horses, from its varying in the same animal so much, has created great embarrassment ; and some are so differently affected to others that it has added to the intricacy of it. Some horses are continually tripping without ever falling ; others are bolder in their step and appear less affected, but fall at once and with more serious consequences ; others are only brought to stepping shortly ; others go wholly on the toe, as the shoe if examined evinces ; these arise from the same cause
operating

operating on different feet and different constitutions of the horse ; the autumnal season, from its weakening influence on horses, will subject them to feel it more, and render them at this season liable to more casualties, though no season is exempt.

There is often, 'I have observed, much shyness in speaking of these things among men; for fear these errors should be imputed to a want of jockeyship ; and few enquiries are made about them for the same reason : no man likes to make enquiries about horses, for that would imply a want of knowledge ; and in the jockey system of knowledge (which has so long and so gloriously swayed these matters in this part of the world) it would indeed be a gross offence to risk such an imputation ; so that every one gets over his difficulties as he can, and reasons about them as he likes.

If the stable-keeper is asked why his horses are so tender before ? and why there needs so much trouble to keep them up ? so much so that all pleasure in riding is destroyed, his answer is, " Why, horses to be sure will by use become leg-weary, and every one who knows any thing about horses knows that well enough," and with a smile at the simplicity of the enquirer he quits the subject.

If any one, not having the usual awe of this character, should ask the coachman why he wants two or three kinds of irons to be put in his horse's mouth, his answer will be, " Why, would any one be so mad as to attempt to drive without them ?" Then if you are apprehensive of your horses' falling, what is the cause of this ? " Go ask the smiths, they can tell you better about it, they do n't shoe them safely."

If the shoeing smith be enquired of respecting this matter, and how does the horse become tender ? " Why, it is to be sure from always standing in the dry litter of the stables, and that is plain enough, for the hind feet are never affected, because they are more in the dung and moisture, which makes it clear enough ;" and thus this business is disposed of without further trouble among them.

Lafosse

Lafosse, many years ago, in France advanced a fair step beyond such idle speculations as the above, by asserting, after anatomically considering the structure and functions of the foot, that this evil of tenderness proceeded from the elevation of the foot from the ground, and the consequent removal of the frog from pressure, which its situation in the foot while in a state of perfect nature seemed to demand; and to remove this difficulty, he strongly urged the use of the thin-heeled shoe*.

Mr. Coleman, the ingenious professor of the Veterinary College, to whom the science has many obligations for his attention to these subjects, maintained the same opinion, and has supported the doctrine by many additional and very ingenious remarks. It would appear, however, that if the cause of the evil had really lain here, the *patent artificial frog*, by bringing the requisite pressure to this part, would have removed the mischief: which it does not appear to do: nor will it be our business at present to consider what would be the consequence of bringing pressure upon the frog, while the quarters or sides of the foot, confined by the nails, or rendered stiff and unyielding by any other circumstance, should resist the expansion.—Suffice it to say, that the conditions premised would be changed, as the foot so treated would be no longer in its natural state: of course the reasonings made upon that foot as in a state of nature become inconclusive; and the result afforded by the actual experiment gives proof of this.

For experience, the severe test and arbiter of the truth of all our reasonings, has shown, that there was some acting cause which stood in the way of the practical use of these doctrines of pressure on the frog in shoe feet; and that, notwithstanding the strong reasons used in the support of it, neither in France, where it was first propagated, nor in England, has the low-heeled shoe gained ground, or been much used; and, if we mistake not, Mr. Coleman has lately shod again with a thick-

* La Nouvelle Pratique sur la Ferrure. Paris, 1754, p. 81.

heeled shoe, provided with an internal clip to rest against the bar of the foot, for which he has obtained a patent. We believe we shall be able to clear up this difficulty respecting the thin-heeled shoe, and to show the cause of its failure; and also why horses in general (as daily practice confirms) go so much better in shoes with thick heels.

Much is often said among the amateurs about this and that principle of shoeing. It does not appear, however, that any alteration of the mode of making and forming the shoe deserves that title; the discretion in applying and fitting it admits of infinite variety of gradations, and these have been often mistakenly termed principles also; and, as though there were two kinds of shoeing, we hear of good and bad shoeing, without these terms having met with any settled meaning or definition.

It is the principle of all the shoeing at present known, to attach the iron for the defence of the foot to it by means of nails driven somewhat diagonally through the lower portions of the hoof:—the manner of figuring the iron, of disposing the nails, of driving them at different distances from the coffin bone, or the manner and degree of paring away the foot, which will influence their distance or approach to the coffin bone, and are all discretionary circumstances only, though they materially affect the feet and manner of going of the horse; yet are not properly difference of principle, but are acted upon in endless variety, according to the fancy of the workman, and often with more mischievous consequences than the principle necessarily entails; and to separate what is owing to the one, and what to the other, is truly difficult, where both are injurious.

I had thoughts of separately considering each of these conditions, and laying down more precise rules for them, that the workmen might have some more regular guide for their labours; but discovering a flagrant and unexpected defect in the nature of the principle itself,

I have

I have devoted my first labours to the making that demonstrative and clear.

It is matter of great surprise to me now, that so obvious a circumstance could even for a day have escaped my notice; but so strong are the prejudices of education and habit, and the perplexity arising from the usual phrases of the workmen about these things, with a certain fear of forming opinions on what appeared to be so mysterious a subject, that years passed with it daily before me without my perceiving this now obvious fact. Mr. Moorcroft, I observe, in one part of his publication, has stated that the foot from a round is reduced to an oval, by shoeing; but here he leaves the subject without a comment: and Osmer, many years back, had obscure ideas of the effects of the compression of the feet from shoeing;—yet neither one passage or the other in these writers had struck me on perusal, till the facts I am about to expose fully opened them to my view, though now it is clear they had both alluded to this circumstance; yet from the general tenor of their works they seemed only to apprehend these consequences from shoeing, in particular cases.

My suspicions awakened, could not rest long without their truth or falsehood being proved; and an experiment for ascertaining it shortly after suggested itself,—that of taking casts in plaster from any sound, healthy foot under the influence of the shoeing process, and repeating those casts from one period to another, and then comparing them with each other, they would then afford me the particulars of change that might take place, and the quantum of diminution of the foot in a given time. Other circumstances unfolded themselves that were not looked for as the experiment proceeded, of which we shall now present the reader with the details.

A young mare of great beauty and turned of five years old was brought to my shoeing forge from Weymouth Mews, to be shod, that had been bred by George Hobson, Esq., and permitted to run
wild

wild and unshod till her fifth year, that her strength and growth should be as much as possible compleated before she was brought into use. The opportunity so extraordinarily afforded me of making the experiment was not to be lost ; for a second, I thought, might not occur ; and such another has in reality never occurred to this day.—Timid, and unused to have her feet meddled with, to get an impression was attended with some difficulty : the plaster of Paris was poured upon her foot held sole upwards ; but before it could well set she grew uneasy at the position, and dashing her foot to the ground broke it in a thousand pieces, and a second also in the same way. After this, as might be expected, she grew more impatient at being handled, and I almost despaired of succeeding, being surrounded by many persons, I hoped to effect it better if she was led alone to the stable ; and giving her a feed of corn, the better to take off her attention, I placed the foot, unperceived by her, in a bowl containing plaster wetted with warm water that it might set the more readily. After waiting a few minutes, and the plaster had become perfectly hard, I drew it away without much difficulty, which exhibited a complete impression of her foot in all its circumstances. This was done in the presence of my worthy and much esteemed friend Mr. John Biddle of Birmingham ; on the fourth day of June 1804, who felt kindly interested in the successful issue of the attempt, and in the nature of this inquiry.

After smearing this impression or mould with a little lard to prevent adhesion, some fresh plaster was cast upon it ; I thus obtained the figure of the foot represented in *Plate I.* ; and for the beauty and symmetry of its parts nature perhaps does seldom surpass it.

That the reader who is not much used to the study of horses may make himself acquainted with the parts of the horse's foot, we shall here describe them in a general manner. They are given for this purpose as large as in nature, that there might be less possibility of error ; for the natural horse's foot has never, I believe, before been very truly represented ;

represented ; and by doing this he will be the more prepared to trace the changes it is doomed to undergo by artificial aid. The representation has been admitted, both by the draftsmen and engraver, to be attended with difficulty ; and, but for the kind assistance of my very worthy and ingenious friend Mr. Sydenham Edwards, it would not have been near so well represented as it is : we may also remark, that a tolerably distant view of it, from its being so large, makes it appear to more advantage than a nearer one.

Of the Heels.—In the representation, Plate I. of a perfectly natural foot, the parts *a* and *b* are the inner and the outer heels, larger, fuller, and more rounded than they are usually seen, having suffered no restraint during the whole time of their growth.

The posterior part of the horse's foot is deeply cleft in the middle, so as to present two terminations. These are called, without any distinction of parts, the *heels*,—though the extremities of the cartilages and their coverings form one part, the extremities of the hoof and the bulbs of elastic matter at the back of the frog, another part, or middle region, and the extremity of the under surface of the hoof, where the heels of the shoe are applied and corns arise, another and a very distinct part, yet they are all included in the same general phrase. Besides this, common usage makes a heel of the back part of the shank, where, if grease chops take place, the horse is said to be “greasy heeled.” If below, or on the fetlock, the same expression is still applied, and occasions at times considerable embarrassment, and is certainly too confused and general for the purposes of science.

This arises from there being no part in the structure of the horse which really corresponds to the human heel. The *os calcis*, the

bone forming the human heel, is situated in the hock of the horse, and is found only in the hind extremity, so far removed from the ground, that no one would think of applying this name to it; and what we term the heels of the horse, have not the smallest resemblance to any part in the human structure: so that it has been by forcing an analogy between parts where there can be none, by using the same terms as though they corresponded, that has created this confusion.

It would be advantageous to that precision which this and every art demands for its cultivation, if this term were entirely removed, and a more convenient expression, suited to the subject, instituted; but such is the force of custom, that we shall prefer for the present the continuance of its use; and shall endeavour, by some accompanying epithet, to indicate the part intended, at least when any ambiguity could arise from the use of the general expression:—such as the *lower* or *horny* heels, for the parts covered by the shoe; the *posterior* heels, or back of the frog; the *superior*, or heels above the hoof, formed by the cartilages:—it is the readiest distinction that in this difficulty seems to present to us. To a division of these parts into horny and fleshy heels, which some might propose, there appears a great objection, since underneath the horny heel will be found naturally the fleshy heel; as under the horny sole is found the fleshy sole, of which it is indeed a continuation, not including the cartilages. The term *fleshy*, also, as there is nothing muscular in these parts, we wish to avoid, in speaking of the *sensible*, or rather *sensitive*, sole, frog, heels, &c.

The position of the foot, in which this representation of the heels is made, gives a view of them receding from the eye, and very much foreshortened, so that their real depth, or height rather, does not appear. They receive their full and rounded appearance from the elastic condition in which the bifurcations of the frog at present exist, and from a plentiful supply of a highly elastic material that is formed within

within these parts. They are defended below by a smooth, tough, horny covering, proceeding from the frog, and which also envelops within the same general covering the upper part of both extremities of the hoof, with a broad dense coat, which in an extraordinary manner will be found to pass round the whole upper edge of the hoof next the coronary ring.

From their elastic properties the heels enable the back part of the foot to extend itself, on receiving the pressure and weight of the animal; yielding with a suitable degree of resistance, on this occasion outwardly, in every direction. It is somewhat singular, and worthy of remark, that those parts which form so considerable a share of the foot of the full-grown horse, have scarcely an existence in the young foal: their rudiments or germs only are seen in this period of their life; for the hoof is then lapped about the coffin bone in a form nearly cylindrical, and is actually larger above at the coronet, than at the base or bottom of the foot. And it is remarkable, that the front of the foot almost singly seems to perform all the offices required of the foot in this stage of his existence; with his limbs held almost straight and erect, and fetlocks very little bent, he in this manner accompanies his dam, his toes at every step digging as it were in the ground. As his size and weight increases, these parts we are describing, together with the frog, are brought more to the ground; and these germs or rudiments of the foot of the foal are, by the pressure and the growth, slowly unfolded: not, however, obtaining their full and completed form till about the fifth year, along with the other members and parts of the body. Nor, may we observe, do they ever obtain their entire growth, if restraint of any sort has been used during this period.

It may be proper, after the foregoing reflections, to state, in order to show that we are not on all occasions desirous of pressing beyond necessity the consideration of the natural foot in this enquiry, that these parts

parts are not absolute essentials to the existence of the foot, since we see they exist not hardly at birth, as essential parts do: it is therefore the fact, that when the foot is deprived of them there are parts left which suffice for the mere purpose of going, though it will be but indifferently and with pain. They will be readily admitted, we apprehend, to have a secondary importance in the functions of the foot; and more we are not disposed to require for them. •

They appear to afford an elastic sort of bed as it were for the weight to repose on, that is in concert with the parts we shall next describe. It is thus that they prevent soreness and fatigue, from too much resistance, which would otherwise be experienced in long standing, or passing over extensive tracts of ground: the pads observable in several tribes of animals allied to the horse appear also to serve pretty much the same purpose.

In contemplating the distribution of the weight of the horse upon the basis or foot, we may remark that it is first thrown perpendicularly upon the fetlock joint, and from thence, in an oblique direction, it passes to the foot, taking a primary bearing on the coffin bone, which distributes it over the inside of the hoof, richly provided with a truly extraordinary apparatus of elastic processes for increasing its internal surface, and preventing the dislodgment of the bone, admitting at the same time of a certain degree of motion of this bone in the hoof, in a direction downwards, and backwards from the obliquely sloping front towards the heels. Next, in a secondary manner, the weight is received on a smaller bone placed in contact with, but moveable upon, the coffin bone, viz. the shuttle bone, which lying behind the former, across the more elastic parts of the foot, by its depression a share of the weight is communicated to the heels and quarters, producing their immediate expansion, as may be seen on pressing upon this bone in the dead subject, especially if it be met at the same time with pressure upon the frog. This experiment should be made on the perfectly natural foot,
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that has not been made stiff and inelastic by the use of the shoe. It appears therefore as though the posterior elastic parts of the horse's foot are in reality designed to receive, adjust, and balance the weight by their spring, in meeting it, whilst the front of the hoof, by its solid resistance against the ground, impels the mass when progression is required.

The foot, being carried forwards before the perpendicular line of the limb, breaks the sudden force of the weight, and again the obliquity also of the front of the hoof occasions it to be determined towards the back parts of the foot, which are therefore so extraordinarily provided with the means of escaping compression and resistance; and these parts we may remark, from their elasticity, are the first acted upon by the application of the shoe, which fixes more or less, according to circumstances hereafter to be pointed out, the yielding parts of the foot: rendered partially or entirely inactive, they lose their functions, and diminishing more or less rapidly, at length become perfectly rigid and inflexible.

The letter *a* indicates the inner heel, which a more accurate view of it shows to be rather larger than the opposite heel. If we were to presume upon the cause of this singular difference, we should attribute it to the different structure of the quarter on this side, in being thinner in horn, or more fleshy as it is called, and elastic; the heel, therefore, that it might concur with it in these properties, seems thus provided with a greater share of elastic matter. At *b* is the outer heel.

These parts, though we are obliged to comply with custom in calling them heels, are in reality only the bifurcations of the frog.

Some writers, who have preceded me in this line of enquiry respecting the shoeing art, have soon quitted its difficulties for the more easy path of anatomical description. We shall endeavour all we can to avoid this further than is requisite to understand the parts deranged by the shoeing. For some account of the natural state and

functions of the foot is indispensably necessary ; and is indeed the only course we can pursue, in order to comprehend how they are acted upon by artificial agents ; the hoof itself, as being most immediately concerned, we cannot fail of giving a brief account of, since most of its parts are visible in the engraving ; and we trust in many respects it will be found widely different from any description of it heretofore laid before the public.

Of the Wall of the Hoof.—The whole exterior conical part of the hoof of the horse is termed the wall. The inferior edge of it only is seen in this view of the foot, circumscribing the sole, and projecting beyond it in order to receive the principal share of the weight.

This conical horny covering is deepest or highest, we may observe, in front of the foot, diminishing in this respect to the quarters ; it then considerably loses the conical shape, and becomes nearly upright, especially on the inside or inner quarter, still growing narrower or lower to the posterior extremity of the foot ; it appears and is usually considered as having its termination there, mixing with the matter of the frog, and describing an oblique slope upwards and backwards, as does the front of the foot. A more accurate examination shows this to be apparent only, for in reality it makes at this place a sudden unexpected turn or inflexion inwards, pursuing its course towards the centre of the foot, diminishing still in depth till it is finally lost in mixing with the sole near the point of the frog, thus forming a distinct and remarkable internal wall for these under parts of the foot in the very interior of the sole, and protecting at the same time by its bold projection the sole and the frog from an undue degree of pressure and contusion against the ground.

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The parts thus formed by the singular means of a continuation of the wall beneath the foot, are termed *the bars of the foot*, and are usually described with, and taken for part of the sole, rather than the wall: their sloping sides, we may remark, whose appearance is most characteristically exhibited in the plate, serve to direct the pressure they receive outwardly, following in this respect the direction given to the expansion of the heels and quarters.

A triangular space is thus wonderfully provided between the inflected extremities of the wall of the hoof for the insertion of the frog, forming at the same time a coved covering for its protection.

This part, it is to be remarked, appears to form the basis or first principle in the mechanism of the hoof, the other parts being all subordinate to this, and if so understood, it will disclose a more easy view of the nature and œconomy of its structure. The inside of the wall is every where lined, as we have before had occasion to state, with the elastic processes, proceeding downwards perpendicularly from the coronet, and in a line parallel to the line described by the front of the hoof: these appear to be about 500 in number, and afford a multiplied and very extensive surface of attachment to the same number of processes growing from the coffin bone, or more truly from the vascular reticulated web covering its surface.

These horny *lamellæ* removed from the hoof appear to have little or no elasticity when drawn in their longitudinal direction; in a transverse one, they possess this power considerably, but in a vastly greater degree obliquely downwards and inwards, for which movement the arrangement of their fibres on closer examination seems to be more particularly constructed.

The wall if decomposed will appear to be formed of longitudinal hollow threads or hairs matted and strongly glued together; and this part receives but little accession of horn after leaving the coronet, except where it meets the sole.

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The outside quarter of the foot, referred to in the plate by the letter *c*, it will be readily observed, is more bulging, or describing a wider circuit exteriorly than the inner quarter is observed to do. The purposes of nature in this unexpected difference of construction appear to be to widen the basis of the foot, and increase its surface of bearing upon the ground, by which it is rendered more secure and firm; and the bearing also thus divided over more points, is made easier to the animal without incurring any danger of cutting the opposite leg, as would be the case if such enlargement had taken place on the opposite side. The horn of this outer quarter is also something stouter than that of the inner, which, together with its greater extent, enables the workman usually to place a nail more in this quarter in fixing on the shoe than in the opposite one*.

We shall only further observe on this part, that as it approaches

* In describing this part of the hoof, we have, in compliance with first impressions and customary habit, considered it as conical. It would not be right to quit this object without observing that this notion is by no means correct: much use in handling the hoof has taught us otherwise, though we have been cautious in stating it at once; for it is our wish to make these remarks intelligible to every class of readers; so that we studiously avoid the unnecessary use of the technical phraseology of the art, so equally we would desire to avoid the use of terms belonging to other sciences that are not in use in these arts. There appears, however, no other course of communicating our ideas than by sacrificing our wishes in this respect: for the sciences are so interwoven that they cannot be understood sometimes but by each others aid: and to leave incorrect ideas would be more culpable than such a step. The figure of this part of the horse's hoof, then, is truly a cylinder very obliquely truncated, its truncated extremity brought to the ground. To show this distinctly, I exhibited formerly in some discourses I gave on this subject a cylinder of brown paper, and this I cut obliquely till it gave the figure of a hoof of any slope in front, so that at a distance it could not be known from the actual hoof: it is also readily seen by taking a carpenter's square, and placing one limb beneath the foot across the quarters, then sloping the other backwards against the quarter parallel to the front, when the edge of the iron would be found parallel to the side of the hoof. In many feet there is, however, a very small spread downwards, but less than could be imagined from a transient view of the foot: this understood, will lead the sculptor and veterinarian to a more just conception of the figure of this part: it is indeed its cylindrical form that causes the back line of the hoof at the heels to slope in the same course as the front line of the toe.

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the quarters and heels, this horny helmet of the foot diminishes in its thickness, as well as in height, affording thereby that degree of pliancy which is requisite to this extremity of the foot: the turn or inflection of the wall at the heel, however, by doubling the horn in that part, gives to it a peculiar solidity and strength, forming in some subjects a stout column of horn, and below a hard projecting knot, which is abundantly useful in receiving the principal bearing of this posterior termination of the foot, and in protecting and defending the portion of the sole inclosed within its curvature, which being a tenderer part of the sole, or in fact more exposed to unequal pressure from the shoe and becoming bruised, is called the corn.

The above curious and unexpected manner of the distribution of the wall is well deserving a distinct plate for its representation; as we studiously shall render this work as little burdensome by its expense as we can, we omit it as not directly necessary to our purpose. Any one may, if he pleases, obtain an excellent view of the arrangement of this part, and follow these remarks, by making a horizontal section of the recent foot about the midway between the coronary circle and the bearing surface of the hoof on the ground; the view thus obtained will exhibit several other particulars in the construction of the foot that will amply repay the trouble.

Of the Frog.—As we have seen that an interruption or break to the continuity of the horny circle becomes necessary for the purposes before stated—of destroying resistance in this part of the foot, so this singular organ is provided to fill up the triangular chasm left by the ends of the wall being inflected towards the centre of the foot instead of meeting at the heels, affording thereby full efficiency to this beautiful design.

This triangle of elastic horn has the effect of, and may not be inaptly
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compared to, an elastic key-stone received into an elastic arch, communicating, in some cases, and admitting in all, the springing movements of such kind of arch. Its base, from its width and quantity of matter, possesses the full capacity of its motion along with the heels, which is gradually lost in approaching the centre of the foot where there is less occasion for movement.

The *base* of the frog lying between, connects together the two extremities, or rather incurvations of the hoof; it then passes over and envelops these parts, restraining their action. The *sides* of the frog are united by applied surfaces to the upper edge of the arch formed by the sole, or more truly, the bar formed by the continuation of the wall. Its *point* extends to or beyond the centre of the sole.

The frog recedes from too much pressure in the natural foot by having its level within the level of the other parts of the under surface of the foot taking a third rate or degree of bearing upon the ground, the wall first, and the bar next, projecting beyond it, its base also further retires from pressure than the other parts of it; and is protected by the projecting angle of the *lower* or *horny heel*.

Continuing our general view of it, we observe on either side the frog deep longitudinal excavations, or channels. These we call, after the example of the ancients, the *commissures of the frog*, the bottom or deepest part of these channels forming the line of union of the bar with the frog: a space is thus afforded on either side the frog, which, as an elastic body, would have been useless without it; for in vain would elasticity have been given to any part unless sufficient room was also given for its expansion.

The ends of these commissures at the horny heels are of tolerable width, and are arched over by a process or extension of the horn of the base of the frog. To this part, by way of distinguishing it from the other parts of the foot, as it will be the subject of some future remarks, we give the name of the *arch of the commissure*; it is this arch the smiths

cut

cut away when they get embarrassed by the falling in of the hoof, and then tell you they are "THROWING open the heels." The other extremity of the commissure growing by degrees shallower, comes out, or is lost in the level of the sole before it reaches the point of the frog.—The cavity of the commissure is larger and wider on the outer side than on the inner side of the frog, and terminates in being carried nearer to the point of the frog on this side.

Seen from without the frog makes a bold projecting appearance, as though it were a solid body of horn, and the smiths, certainly deceived by this appearance, entertain but indifferent notions of its real structure, for it is in reality an inverted arch only of horn, that is, turned downwards and reversed in respect to the general arch formed by the sole and bar, that its real thickness in horn is not so considerable as on a first view it would appear to be.

The frog seen from within, that is to say, when the foot has been drawn forth from the hoof, presents an inverted triangular arch so intimately connected with the bar and sole, that no one would suspect it of being a distinct or divisible part, one uniform uninterrupted porous surface every where being observable on this inside: it may however be exhibited as a distinct inserted part, by making a horizontal section of the foot through the union of the bar with the side of the frog, when the difference of their structure and appearance, and the line of their applied surfaces become sufficiently visible and distinct.* A hoof exposed to the weather, will also be seen in its decay to separate at this part first, so that it is assuredly a very distinct part from the rest of the hoof. By actual admeasurement in several instances, for they are indeed at present truly rare of nearly perfect feet, we find, in a remarkable manner, that the base of the frog occupies a certain division of the general circle of the hoof, and that this division is about a sixth part of the whole circumference: by knowing this fact, we are not only led to entertain more just notions of the form of the foot, and the proportion of its parts, but

it affords us also an easy means of forming a pretty accurate guess of what injury or diminution the foot has sustained at any period of the life of the horse, without previously seeing the original state of the frog.

Next from this more general view of the frog, we descend to other particulars in the construction of this singular organ that appear to have remained almost or entirely unnoticed ; and first we shall observe that the frog is connected in a very unexpected manner with the front of the foot ; the wings or lateral processes of the base of the frog not only enclose, as already stated, the ends or doublings of the hoof, but the same horn is continued round the whole line of the commencement of this part of the hoof immediately beneath the coronary ring, forming a convex band, whose upper edge or margin projecting higher than the hoof itself, receives and covers over the terminating edge of the skin where this part meets the hoof, and thus protects it from injury or dislocation by external violence of any kind ; it also seems to serve the useful purpose of keeping those parts moist and pliant, preventing irritation ; for when wetted it appears readily to absorb moisture, and continues of a darker colour in consequence, whilst all the other parts of the hoof are suddenly dried ; it has the power it would seem, when no external wet is artificially applied, of collecting the perspiration of the skin, thus maintaining the proper tenacity and pliancy of these parts. Every one used to examining the hoof of the horse, must have observed, when the foot is drawn out of it, a projecting eminence of soft horn, with a channel inside it, being the upper edge of this band ; this appearance we had long ago noticed without till lately observing from whence it had its origin : besides the uses already ascribed, of connecting together the upper circle of the hoof, supporting and adapting it to the sensitive circle, it strongly binds the frog in its situation by connecting it with the front of the hoof and to the upper part of the slope of the horny heels.

This band makes a small appearance at two and three years old ; but

as the frog acquires its size, this also completes its bulk and form. This essential part of the foot of the horse appears hitherto to have remained almost undistinguished ; we venture therefore, for the convenience of speaking of it without a circumlocution, to give it the appellation of the *Coronary frog-band*.

As it forms with the frog, so it appears to diminish and suffer with this part, making often a white and withered appearance, especially against black hoofs. Its strong adherence to the hoof occasions it to be carried down with it, but it shortly after dries, cracks, and falls off, leaving a polished sort of epidermis to the wall of the hoof.*

If we observe the base of the frog in the engraving annexed, there

* In the works of Professor Coleman there is a Coronary Ligament described and figured, Plate 3. p. 225, g, g, g. vol. II. on the horse's foot. This ligament, I at first apprehended might be the *Frog-band* in question, but on examining the description of it, it appears not at all to accord with the part here given. The *Frog-band* in no respect partakes of the nature of a ligament, but is of nearly or quite the same matter as the horn of the frog ; neither is it lodged in the coronary concavity of the hoof. Where this part is said to be found, this concave part of the hoof has ever appeared to us to be filled up simply by an enlargement or process of the skin itself, that is the *cutis vera*, not separable in any way by dissection, or maceration, or any other means we could devise. One should apprehend it was some inadvertence of the dissector, who had by the knife formed the skin into this appearance. In suggesting, however, this probability of an error (if it be one), we could desire to elicit the truth by further enquiry into those parts, for they have been really but little examined ; and in doing this we could wish to testify our respect for the head of an establishment we ardently wish to see flourish, and whose works alone we have thought deserving of notice ; and ask but the same charitable construction on our own errors from others. Indeed it is high time the wretched style of declamation and abusive writing on these subjects should give way to a better taste, that of real investigation and research, as in other objects of a scientific nature, by which alone the art can receive any useful accessions, and mankind and the horse be benefited.

The empty verbosity of style alluded to above began about the reign of Charles the Second, or a little earlier, and has continued with few exceptions ever since. It was unknown before this period, and was in reality the natural produce and legitimate offspring of jockeyism and the race-course. How little has been added to our knowledge by such writings may be readily seen, and in what a disgusting light they begin already to appear.

may be remarked about the middle of it a pretty considerable cavity or excavation, the edges of which are truly represented with rising lips or prominent margins of stouter horn:—this hollow is termed the *Cleft of the frog*; the sides sloping pretty suddenly, form a longitudinal line at the bottom of the cavity, thus terminating it.

This cavity appears to serve the following useful purposes. It is a safe-guard from rupture between the two halves or divisions into which the foot is almost separated at this part; by closing when pressure comes direct upon the underside of the frog, it prevents too much condensation of the horn of this part, and consequent pressure, and a too solid resistance upon the soft parts beneath; when the foot bears, partially on the ground, as by one side only, which will happen occasionally where the surface is irregular, it can extend along with that side of the foot without rupturing, by the greater liberty it thus affords to the part, and the strength of its margin secures it from laceration.

This Indent or Cavity may also in soils of a looser nature hold the foot more firmly, by the irregularity it offers to the surface; as in sands, &c.

But what we could wish to have more particularly noticed respecting this cell or cleft of the frog is, that it is prevented from rupturing inwards towards the quirk by a stout considerable cone of horn passing directly from it into the sensitive frog, and of which cone this cleft will be found to be only the hollowed base. It is also worthy of notice, that this solid cone of horn, though passing within the sensitive parts of the foot, is nearly or quite as hard and tough as is the horn in the exterior of the frog exposed to the air.

This singular provision, hitherto so little regarded, seems to serve the purpose of uniting more firmly the two halves, of which the foot, at this part, really consists; there being a tendency to a division in the horse's foot as in the cloven-footed animals.

This

This cone of horn not only forms the main barrier to the separation of the two halves when violence is offered ; but what is more worth our attention is, that it appears to be this part when forced or destroyed that becomes the source and cause of the *Running Thrush*, and which understood will lead us to a better knowledge of this disagreeable complaint. As we mean on some future occasion to give a more enlarged account of this matter, we shall only state here very briefly the manner this appears to happen. When this Cone is defectively formed by nature, as by the want of sufficient bulk, or by weakness of its contexture—when reduced or wasted away from the same evils that reduce and waste the general mass of the horn of the frog—or becoming too brittle, hard, and dry, is in consequence liable to be broken by external violence—or is decayed or weakened by much exposure to wet or filth ;—in either of these cases its rupture admits a passage and lodgment for external destructive agents, as wet, dirt, urine, &c., and thus the Thrush appears to be formed ; or even its own Secretions lodging in the part are sufficient for this Effect : these destroying the horn, at length reach the quick and sensitive parts, whose irritated surfaces produce the discharge in question, extending afterwards between the halves or bifurcations of the frog.

It may also have escaped the notice of some engaged in these studies, that an extension of the skin passes beneath the frog, and exists also between the bifurcations, and is the first part or surface that gives out the thrushy discharge, till at length in bad cases it gets destroyed, and the more internal parts become affected. This curious fact may be noticed by slitting open the frog and turning it back, when the skin may very distinctly be traced growing thinner as it approaches the sole.

In respect to the nature of thrushes, there has been a difficulty attendant on their formation at times, that has created much perplexity from the views formerly had of them ; but which, after what has been explained,

explained, appears to admit of an easy solution, which is this : That it has often happened, that a horse brought to the stable from grass shall suddenly appear with a thrushed foot, though such a thing had not before been noticed, or was noticeable, at least on his arrival at the stable : a satisfactory account of this appears to be, that after this above-described part has been once ruptured or weakened, or thrushed even, it shall be formed again by a fresh growth of the part, especially if the foot be kept cool and moist, as at grass, &c. the disease shall appear obliterated, and the part closed up ; but the new-formed horn not having the same attachment to the surrounding parts as the original horn, and being of a weaker nature, shall merely by the exposure of the foot to the heated litter, with heating food, and the other inflammatory agents of the stable, shall rupture again, give out a discharge, and become a complete thrush. Though it has appeared to us probable, we do not positively assert this to be the fact till further experience has confirmed it : for conclusions without a close attention to all the circumstances, are but too often erroneous ; but it appears highly probable.

This remarkable cone of horn is flattened on its sides, that it may have a wider surface of connection with the two halves between which it is situated, and its strength in a longitudinal direction, combining the two heels, is not thereby at all diminished.

This important part has not hitherto been much noticed, or received, that we are acquainted with, any distinctive appellation : we have therefore ventured to call it *the Frog-stay* or *Bolt*. Like an inserted tooth, it more firmly holds the horny to the sensitive frog ; for whilst the sensitive frog falls into the inverted arch of the horny frog, and is thus held most firmly in its place, this part entering in the opposite direction into the sensitive frog, serves reciprocally to confirm and fix these parts together, and preserve them from external injury and dislocation.

An excellent view is obtained of it by a perpendicular section through the heels, together with the surrounding elastic matter.

In very young horses this part appears to be very weak, or entirely wanting ; and it explains how very subject they are to thrushes at this period of their lives. As the frog gains its growth, this part grows up, and obliterates the division of the heels.

It has been generally imagined hitherto that contracted heels was the great cause of thrush ; but we may remark that the last stage or degree of contraction may exist, in feet, without any thrush whatever : it is therefore not a necessary consequence of the contracted heel, but of the casual occurrence of certain circumstances we have described ; for the converse of this is also true, viz. that without any contraction at all there shall be thrushes, and one contracted foot shall have it and not the other, though equally so, and of the self-same horse.

We hope this discovery respecting the nature of thrushes may not be unacceptable to those who are in any way interested about horses, as it sets in a clearer light the genuine source of a very obscurely-beheld and disagreeable complaint.

The *Frog-stay*, it is evident, will essentially co-operate with the coronary Frog-band above described, in keeping the whole structure of these parts together, and especially under circumstances that might tend to disunite them, as in the suction of strong clays or swampy ground.

This part is stronger in proportion, we have thought, in horses of the blood than in coarser bred horses.

There remains to be noticed one part more in the structure of the frog, which it would be improper to pass over, particularly as it appears well marked in the engraving : this is the rotundity or swell of horn observable between the above-described cleft, and the point of the frog, rising considerably more to the light than the rest of the

frog. This is the only foot in which I recollect distinctly to have seen it, for it is the only foot at five years old that I ever saw that had not been in one way or other mutilated by the smiths, and at an earlier period than this all the parts of the foot are not developed. On making a perpendicular section of the foot through this enlargement, it is found nearly opposite, or under the *shuttle bone*. A two-fold purpose is combined in this, as in most other parts of this exquisite piece of mechanism. It appears as though provided to defend the important tendon passing under the above bone from injury : it contributes by its pressure to give support to this tendon, by pressing against it at the moment of its greatest extension, which takes place while the foot is on the ground impelling the weight of the body, and prevents it from being torn from its attachment, or breaking at the sudden turn here given to it in passing beneath the coffin-bone ; and it doubles the force of its attachment, or more than doubles it, if the strain be more, for if the pressure of the ground permit it, it will be proportionate. It also serves to defend the joint formed by the two foot bones, and the most important soft parts of the foot.

By way of distinguishing this useful part from the rest of the frog, we have familiarly called it the *Cushion of the frog*. In young feet it is not very distinguishable.

Having given our views of the formation of the thrush, and the several parts composing the horny frog, we subjoin, as best suiting this place, a few particulars hardly less necessary to be understood, of the œconomy of this part, as to its growth, and casting off its excess or superfluous growth, its rags, exfoliations, &c. ; and these remarks will tend to displace some hitherto generally-admitted doctrines in the practice of shoeing ; at any rate being distinctly stated they will come upon the carpet of investigation, which may be of some use in clearing up difficulties, by leading to further observation and enquiry respecting them.

The growth of the frog, which appears to be naturally slower than that of the other parts of the foot, seems to be nearly or quite arrested by the process of shoeing. We should, however, first remark, that it is the current opinion of the shoeing smiths, that if the frog is left to itself, it "will run," as they express it, "all over the foot;" therefore they pare it, to keep it within due bounds. Their statement is wholly a misapprehension, for the frog has the perfect power in itself of maintaining its own figure, beyond which it will not pass. The proof of this is before us in the frog here presented, which for five years untouched by any cutting instrument has maintained the surface and form we see it possess. After attaining the prescribed extent and thickness of horn it appears to form scurfs, or falls away, leaving the frog ever of the same figure. Nor need we be surprised at this, since it is the same with the sole, which, passing the assigned limits of its thickness, loses its tenacity, forms into flakes, and moulders away, thus preserving without human aid (which in a state of nature it could not receive), the concavity of the sole, in which property the frog also is only concurring, though in a different way, suited to the peculiar nature of its horn, that this idea of the smiths is perfectly groundless, and without the smallest foundation, at least in a general way; for we may remark, there are now and then occurring large relaxed frogs, of a prodigious size, that seem an exception to this rule: they are, however, so rare, that they ought not in the least to disturb it. They occur principally in large draught-horses, bred in low swampy situations. So little frequent are they, that in several years attention to these objects we have not met with more than three or four in some thousands of horses; that unless it be to those who may prefer an exception to a general rule to reason from, they cannot invalidate the prevailing truth of the conclusions here drawn; and even these relaxed and weak frogs demand the horn that covers them, which is of a softer nature suited to their defence, as much as the harder

harder horn usually found with frogs is required by them : that this idea of the frog requiring it to be cut, in order to prevent its running over the foot, can have no real foundation.

Next there appears a more plausible motive for cutting the frog, which is this, that from the defence afforded by the shoe the parts of the hoof are growing, and having no means of wear, it must be removed before the shoe be applied again, the sole held firm by the nails embracing the wall, its flakes have not the opportunity of discharging themselves, and will also want removing with the knife, as does usually a portion of the sole, which thickens under these artificial circumstances, and the frog of course, say they, should undergo the same sort of discipline in being pared with the other parts ; and this reasoning has met with acquiescence from the commencement of the shoeing art probably, to this day. The projecting solid appearance already noticed of the frog,—its consistence resembling that of leather or hard cheese, cutting with a smooth and polished surface, invites the knife, and causes it to be more sliced on this account we apprehend than it would otherwise be, and the workman fashions it to the conception he has formed in his own mind of the figure this part should receive. Now this proposition or reasoning of theirs is not so much to be complained of ; I would that their reason was always as good in all other instances, though this is too much to expect in the uneducated, as we daily have reason to see. What we have in this respect to advance will, we believe, carry a conviction of the propriety of a different doctrine as to this part, and more suited to the peculiar nature of it ; which is this, that the frog, naturally slower of growth than the other parts, becomes after a time stationary as to its growth, and diminishes in some degree from the first application of the shoe. That its growth is impeded, or rather wholly stopped, after it has been some years shod, we may be assured of, and in what degree it is so, by marking or cutting a small notch upon its surface, which

which we have found by experiment to take very many months to grow out. We once closely watched the frog in an old horse, which frog had been considerably diminished by long shoeing, for several, as eight or nine, months, without any instrument whatever having been suffered to touch it, and at the end of this period the frog was not visibly larger than at first ; and this singular fact can, we believe, admit of explanation even. The wall of the hoof, we may remark, where there is a demand for its wear, grows rapidly, as when in a state of nature, and exposed to the ground ; but shod it loses this power to so great a degree, that in many horses a few thin slices only can be removed at each shoeing, after the interval of a month or five weeks, in which time twenty times as much horn would have been produced had there been a demand for it ; so that the arrestation of the growth of the frog (which is of slower growth than the wall) is not so surprising, especially if we reflect that, the heels closing from the compression of the shoe, the frog becomes squeezed, which weakens its nature, its cut surface drying and hardening, compressing it also in this other direction, that its circulation and health being affected, the failure of its growth appears to be a necessary consequence : so that it is from these circumstances we are led to infer that the frog, from the moment of the commencement of shoeing, will, without any cutting at all, diminish more than fast enough.

But, like most general rules, a discretion may be necessary in some cases. A deeper and larger frog than ordinary will at times occur, that will reach even below the shoe. In this case a thicker heel, or a shoe a little turned up, will prevent it from too much battering upon the ground, though this difficulty will not often happen.

We shall next consider another alleged motive for cutting slices from the horn of this part ; which is to remove the rags. Let us now see what these rags are, and how they are formed, and we shall in truth see whether this be necessary or not. That there is no rag nor

scale in the frog presented to the reader is evident by the inspection of the plate, which gives a precise copy of its surface ; and so it is almost ever found to be in the generality of frogs at the commencement of shoeing the feet, if a slice be taken away from this part, its exterior coat removed, and interior one exposed ; which, being of a moister and more succulent nature, quickly dries in the air and heat of the stable, &c. and, contracting, cracks ; the edges of the crack, in drying, reflect or turn back, and create an uneven ragged appearance of the frog ; this they remove by a deeper incision, getting nearer and nearer to the quick at each cutting ; till the frog, flayed and diminished in its size, and dried and brittle, becomes too tender for the contact of hard bodies, and thus, earlier than there is any occasion, is created a source of grievance and danger in the use of the horse ;—or, at other times cracking through to the quick, wet cankers the foot ; or in other cases, as we have sometimes observed, the frog contracting under this procedure more rapidly than the quarters can follow it, a separation at the commissure takes place, with destructive consequences.

This recommendation, without being further explained, might appear similar to the usual recommendations on this head heretofore given in most books on these subjects : there is this difference, however, that their apprehensions were directed solely to the quick or living part of the frog, lest this should be too much exposed, admitting at the same time the propriety of the smith's opinions about over-growth and rags, which they considered as creating a necessity for its being pared. Our view in not cutting is to preserve the exterior of the frog as entire as possible, having proved that there is no fear of its passing beyond its natural figure and assigned limits, and from its outside covering being as necessary to it as the exterior cuticular covering to any other part of the hoof ; indeed more so, from its exposed situation to the road. Our only apprehensions in making this recommendation a general one are, that in some cases the frog
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may get too much pressure, unless the shoe be thickened or turned up at the heels to accommodate it: nor need this be long continued, as the frog will begin to waste and shrink soon after the shoeing commences, so as to remove the necessity of this measure; nor would this be at all necessary, but on account of a remarkable circumstance which takes place in shod feet hitherto unobserved; but which will be seen in the experiment hereafter to be related, *viz.* that on the first application of the shoe to a natural foot, the frog falls and drops below its level; and this takes place, it would appear, from the operation of two causes; one is, that the weight of the horse pressing into the hoof, and its sides not being in a state to expand, being confined by the nails, a severer pressure downwards ensues, forcing the frog, and keeping it permanently below its level; and the other is, that the frog elevated by the shoe, and not experiencing its usual support from the ground, cannot but remain in this state; but this first effect only lasts, or has the appearance of lasting, for a time; for the nature of this compression occasions a general diminution, by absorption of the posterior soft parts of the foot, and they adapt themselves in some degree to their new condition; so that what with its own diminution, and the general absorption of other parts, it resumes in some degree its former elevated situation in the foot, where the thickness of the shoe is in general fully sufficient to prevent its being battered too much upon the road, so that I doubt if this rule may not be rendered absolute of not cutting away any parts of the frog, unless some accident causes the discretionary use of this hitherto incalculably destructive procedure.

As there are at times *Exfoliations* of the horn of the frog taking place, and which, being observed, have been often supposed the natural means used by it for ridding itself of superfluous growth, but which we have already stated to be performed by a more simple process; so our researches have led to different conclusions respecting these remarkable exfoliations. Indeed it is our wish to bring only that part of our studies before

before the public which have led to different conclusions from the usual views of these things, as being the most useful sort of addition to the stock of knowledge we are already in possession of ; which will account for the frequent claims we have made to novel views, or the discovery of new objects in this work : we wish that most of them may prove correct, and stand the test of that enquiry we could wish should take place about these objects, which cannot but be for the advantage of the public, by improving the knowledge concerning these animals ; and will lead in time to their better treatment, for much abuse springs from the disappointment which expectations ignorantly founded occasion.

The exfoliations of the frog appear to be too irregular in their occurrence for a process that should belong to the necessary growth of any part, and seem in reality to be the attendant of some change of circumstances to which the frog is exposed : as for instance, if a horse that has been some time shod, and kept in a stable, be suddenly turned out to grass, the horn swelling and relaxing, a deep exfoliation will take place, and a succession of these exfoliations will follow, each being longer in forming than the preceding one, till it becomes in some degree suited to its new situation ; if now the horse be brought back again to the stable, the horn so formed at grass will be thrown off, and a new succession of exfoliations be carried on, till again the part gets habituated to the circumstances of its situation, when they will cease to form, or only form in very long periods. This appears the habit of this part in this respect, which having stated, we leave for future more correct enquiry.

Our next and last consideration, regarding the œconomy of this part, will be an enquiry into the probable degree of pressure which nature has designed it to receive. As on this important circumstance is principally founded the hope of relief from the evils of shoeing, I could wish to direct more particularly the attention of my brother professors

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in the veterinary art to this object ; and whether more has not been set down for this part to do than Nature designed it should do, or than it has powers to perform, and which has been one great obstacle frustrating their views.

To expand the heels, we may observe, by bringing pressure on the frog, is much for this part to perform, even in the pliant natural condition of the foot, and from being in itself a soft part is the utmost extent of its power, when we consider the resistance these parts actually make ; but when the hoof is in any manner restrained by the nails passing through the shoe and round a considerable portion of the wall of the hoof, this difficulty will be much increased ; and as we shall see presently how soon the foot is rendered stiff and unyielding by their influence, we shall be led the more to observe, that it is imposing more exertion upon it than it can long endure without becoming tender ; and that if exceptions can be found in very strong frogs to do this, it will not be so with the generality of them for any length of time, as we apprehend experience has long ago shown from such sort of shoe not being used, even by those who are best acquainted from their education with its properties and application.

A few particulars respecting the structure of this part, and the offices it seems designed to execute, will set this in a clearer light.

We may remark one beautiful provision that is made in the construction of the horse's foot, for the relief of the softer parts from pressure, when it is of a nature that does not suit them, as in the circumstance of a horse standing on hard ground, or a paving of stone, &c. he will then have the lower circle of the wall only in contact, or touching the surface ; but if on yielding, softer ground, every part of the foot in succession takes its course of bearing in the following order, the wall, sole, bars, and then the frog, being the last that is brought in contact, and is the softest of these parts in its structure. The pressure under such circumstances is distributed over

so large a surface, or divided into so many points, that it cannot be severely felt by any of them ; and least of all, those parts that last experience it, or that are the furthest removed from the soil. The bars appear in this case to be acted upon in the manner already described, forcing by their direction the heels outwards, and thus first relieve, and prepare a way for the share of operation the frog is to receive : acting then without much compression. Much less does it appear in the views of Nature, that it should drive out the heels by forcible pressure against them, which would produce first fatigue, and then soreness ;—for these parts to act well, a certain share of liberty is necessary among them, one should apprehend.

If we turn our attention to the nature of the frog itself, we find it no other than an inverted hollow arch, of not very hard horn, filled with soft matters within, that appear incapable of great resistance, or of carrying much pressure to the neighbouring parts*, such as might be looked for, for such an effect as forcing the heels, that the horn of the arch must be depended on almost alone for this purpose. Let us also see the manner in which this horn of the frog is connected to the bar by its upper edges, or margin : being the heels or foot of the arch by which the arch seems weakest for any forcible action : and its being also not so strong and hard as the material it has to act against.

It appears, in fact, that it is not so much from the upward pressure against the frog, as from the downward pressure of the limb and weight of the body upon the bones of the foot, that should produce this effect of expansion upon the yielding contents of the hoof and heels ; timely assisted, and in due time prevented, from too much de-

* It will probably be urged in opposition to this, that parts, though ever so soft, will resist with the same force as hard ones if confined, which is certainly true, after considerable condensation ; and this might happen to the frog ; but the hollow cavity on either side of it, of the commissure, will prevent such a circumstance, as well as the descent of the frog under pressure from above, which ever brings it into a more open space downwards.

pression in this direction, by meeting with the support of the frog then brought to the ground at the time the strain and weight is greatest: the sides of the foot then expanding laterally through their whole extent, and springing back again to their places on the removal of the exertion and weight. And they must, in any violent exertion, as in galloping, &c., where the force is tenfold that of the mere weight, make these parts, if at liberty, play, or expand to an extent, that merely considering the hoof in the hand can give us but a faint conception of. In standing on hard ground this part will scarcely be called into action at all, much less would it appear to receive well a continual pressure, as has been proposed for it, to force asunder and keep the heels extended; which ought to be extended principally by their own disposition under pressure to pass outward.

And next, with respect to the natural distance at which this part is placed above the ground, and the other bearing points of the foot:— in the annexed engraving of the foot, the distance, or recedence of this part within the foot cannot be known, as the perspective (the view being direct) will be insufficient to obtain an idea of it; but with the original cast, or model before me, the opportunity is afforded of measuring these circumstances, which I will endeavour to do with all the accuracy I am able; and as this foot has attained the fifth year of its growth without the least restraint from artificial measures, so it will be a fairer example to reason from, than at present can any where be found; for the operation of the iron upon the natural foot is vastly more rapid, than any one not having investigated this matter would believe: but of which we shall presently afford demonstrative proof. And it is from such shod feet that, hitherto, ideas and reasonings on these matters have been formed; it being naturally apprehended that as soon as the shoe was off the foot, the foot was again in a state of nature, that is, if it had a sound, and tolerable appearance to the eye; for the eye also soon gets used to deformity, and

and does not discover it. This error it was that embarrassed and misled me in all my first experiments, on what I conceived to be the natural foot, during several years, and completely obscured my views of the true nature of these things, and my predecessors also, as the general tenor of their works will indicate. Quitting, however, these remarks, we proceed to an examination of the actual state of the frog in the natural foot, for another full grown natural foot we are not likely soon to see again ; as this can only be done by a horse kept expressly for the purpose. But any one who is so disposed, has the power to follow us by so doing, and to detect any error if we have misstated any circumstance, which we shall not at any rate intentionally do.

This model, or cast of the foot, turned downwards upon its proper bearings on a flat level table, gives an elevation of the frog above the bearing surface of the wall, as nearly as I can measure it, of about three eighths of an inch in the lowest part of the frog, which is found to be the margin, or lips of the cleft.—Where the frog meets, and embraces the horny heel, half an inch is the height ; at the extremity of the base of the frog, the elevation is one inch above the level of the table. Now this distance of it within the other parts would lead us to conclude, that it was not designed for that considerable degree of pressure that has been apprehended ; this, together with the softness of its horn, compared with the other parts of the foot, and the almost, we could have said adventitious nature of the part, as from its non-appearance in the young foal, stated on a former occasion, would serve to strengthen our opinion in this respect.

Nor can we omit to mention another circumstance, which appears to come in strong confirmation of these ideas respecting the frog ; which is a passage in the most ancient of all the authors on the subject of horses. The venerable Xenophon wrote several hundred years before the art of nail-shoeing was had recourse to ; and he
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remarks, in his advice respecting the choice of a horse, "that the lofty foot is to be preferred, as in it the frog is raised high above the ground;" and he further compares those horses whose frogs come to the ground to "cripples among men, who are wont to go on parts nature never designed they should." The above particular advice appears to point out two curious circumstances: first, that they did not shoe, for that would have raised the frog high enough, and higher than was necessary, and made the recommendation useless; and it shows, also, that, by their use of the foot in the natural state, they found by experience that, if the frog was low, by battering against the ground it was subject to become tender; hence the preference given to the high-placed frog. After the same manner do the veterinarians of the second and third centuries, who were employed in the Roman armies of the Eastern Empire*, recommend the choice of a horse's foot, but emphatically add "small" to "an elevated frog," as it must, no doubt, be not so subject in consequence to become tender, from being less soft, as well as less exposed to the road.

I have, however, observed that in young feet, that is, at two or three years old, the frogs are on a lower level, in respect to the other parts of the foot, than at a more advanced age. All the parts of the foot, especially of the posterior parts, are then in a more supple state, and may receive from the frog that pressure that will unfold and open them to the extent nature requires, in which the bars will also cooperate with the frog and heels. This purpose effected, and the growth and strength of the foot completed, the frogs assume a higher station, more out of the reach of too much battering upon the ground.

* As this work is very rare in the original language, and we happen to possess it, we shall give these extracts towards the conclusion of the second part of this volume, where we propose more at length to consider the practices of the ancients in respect to their horses' feet; and to bring proof of the most direct kind, so as to place it beyond a doubt that they did not shoe at this period, nor till after the fifth century.

This I mention, lest a casual view of the frog in a young horse might lead the reader to suspect this statement not to be correct.

Indeed, after a consideration of all the circumstances, our conclusions would be, that the frog was not designed by nature for much pressure, and that only at intervals, under strong exertion to relieve the other parts;—and we may remark, the pressure of the nails of the shoe is perpetual; (and so should be the pressure on the frog to resist it; if contraction is to be prevented by this means): but this will be most forcible when the animal is in action, and the expansion of the foot called for by the inward pressure upon the contents of the hoof, which then strain ineffectually against the nails.

For though much has been said about the frog being raised from the ground by shoeing, and this elevation is certainly an evil consequence of the shoe, it is but one evil effect of it, and that in our opinion not the greatest.

In concluding this account of the frog of the horse, it may be matter of curiosity to some of my readers, to know the various appellations this singular part has obtained with different nations. The French call it *La Fourchette* or the fork, the Latins *Furca*, and once only in Vegetius we find the term “*Pendiginem*” applied to this part, apparently from its hanging down or being suspended from the roofing of the sole of the hoof, as it might appear to them. The Greeks termed it *χελιδων* or the swallow, having a distant resemblance to the oval pointed body of that bird; the circle formed by the heels and quarters would give a faint idea of the arched or sickle-like shape of their wings in flight; so that the appellation seems every way correspondent to the bold and fanciful imagination of this wonderful people. It ever occurs, however, with them, in the plural, *χελιδονα*.

The extraordinary origin of the term *running Thrush* from the Latin word *Furca*, which we have traced satisfactorily, will be found we apprehend amusing enough: *Furca*, in French *Fourche*, and its diminutive

diminutive *Fourchette*; this contracted became the *running Fourche*; and from thence we find about the days of queen Elizabeth, as in *Blundville* and other writers of this period, *running Frush*; and subsequently, in James's reign, and after this period, on the establishment of horse races, and the prevailing influence of the jockeys, who, not finding in their vocabulary of English words such a one as *Frush*, declared it must mean a *Thrush*, and a *running Thrush* it has ever since been called by the whole kingdom.

Of the Sole.—This is an irregular plate of horn, which serves to close up the space or great inferior opening described by the lower circumference of the wall, and makes the third member or part of the hoof, for in reality it is formed by no more than three distinct pieces beside the frog band.

It is usually of an arched form, more or less flattened; its concavity to the ground, its centre more in action and thinner, is by this means removed from the degree of external pressure which the sides or bottom part of the arch have.

Nature has secured herself most remarkably in two ways, from the resistance which an arch of common properties would create, in becoming more condensed under pressure, and forcibly resisting the load brought upon it, which would have been subversive of the leading principles in the mechanism of the hoof:—the sole is therefore cleft to its centre even, or beyond it, by a large triangular opening formed at its posterior part, which destroying the resistance of the arch serves to receive the ends also of the wall of the hoof first, and is then closed and filled up by the insertion of the inverted arch of the frog; so that the ends of the hoof are thus tied in, and secured from being forced asunder

asunder by the pressure from within, being thus wedged in between the frog and the sole, and are made to serve in their places the other offices we have already noticed, while the sole being thus broken has a diminished resistance at its centre.

Again : the lower circumference of this arch of the sole, which may be considered in the light of the heels of the arch, is every where abutting against the sides of the wall, which are rendered sufficiently flexible outwards to yield to the weight when pressed against by the descent and flattening of the sole, so that, as we have just stated, the sole is thus rendered doubly secure from that resistance that would be injurious to the functions of the foot, and the elasticity so essential to it, is by the arch of the sole springing outwards with the rest of the hoof, fully obtained.

The shoe being perfectly inflexible, wherever nailed, will fix the parts of the wall more or less, and resist its action ; the weight falling on the sole, it must then depend (the sides of the hoof being fixed) upon the fissure inclosing the frog for its relief and yielding, which collapsing will cause, as we have before stated, the frog to be compressed and to descend from its natural situation, and the bars to approximate ; the sole, by having less action, is daily thickening and losing its natural powers of motion, and of throwing off in flakes the superfluous growth, and disorder and contraction ensue : sometimes, if the nails are brought very close or the shoe be made too small, and the hoof be not of the strongest order, the sole is forcibly thrown upwards against the coffin bone, and creates great uneasiness and lameness, which is blindly attributed often to standing in the stable, which may assist by its dryness and heat, but cannot alone operate such effects.

The sole not only loses its properties by shoeing, but the wall of the hoof also appears singularly affected, though in a different manner, agreeable to the difference of its nature. There being, we may remark, but little call or demand for horn during the application of the shoe,

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or we may say none at all ; the natural wear being prevented ; this part takes to growing so very slowly, that in some feet a few thin shavings is all that can be taken away on the removal of the shoe, after a month or six weeks growth ; and what we wished to remark further on the effect of the shoe is, that the natural growth is not only impeded by it, but the wall, in an extraordinary manner, appears to lose the power of maintaining its own form, and will grow if left to itself to a prodigious length, which the natural hoof before shoeing is never disposed to do, even in the softest meadow, where the figure is preserved though the wear must be trifling compared with the growth : in horses sometimes, but very frequently in asses from being more neglected, these sort of deformed hoofs are observable grown out to such an inordinate length as to turn up in front, and incommode the animal very much, and which formerly, on noticing, we were totally at a loss to give any satisfactory explanation of.

The horse's hoof is therefore not only the most considerable single mass of horn for the defence of the extremity of any animal, but it appears more richly organized than any other, and is fully provided with the means of preserving its form, when left to nature, but which power it appears to lose on being shod. .

But to return : the sole is thicker where it adheres to the wall, growing thinner to its centre ; but opposite the middle of the side of the frog, uniting with the commissure, it appears to be thicker than in any other part, at least in shod feet ; for it is with regret we state it, we have not yet had a fair opportunity of seeing it in the perfectly full grown natural foot, which we could very much wish.

From the view we have taken of the horse's sole, it will be seen how imperfectly the ancient phrases of *Solidungula* and *Solipes*, &c. would serve to convey a true notion of this kind of hoof ; for though the front be solid, the posterior parts possess the greatest degree of

elasticity short of being actually cloven that can be imagined, from the sole being opened to its centre and filled up by a frog. In such a covering as a *Solidungula* would seem to imply, or a continued circle of horn, no animal could long stand, much less move without great fatigue and pain from compression which would soon become destructive.

If it were necessary to make use of a single epithet or phrase for this sort of foot, the term *Semifissipes* or half-cloven foot would be less objectionable, though also not exactly true, on account of the presence of the frog, which appears to afford the most essential character of this kind of foot, added to the entire hoof in front: finally, respecting the structure of the sole, we may observe that the arch it describes is not uniform, but of an irregular waving figure, bending downwards on its approach to the inside of the wall, then passing upwards or horizontally to meet it, and forming by this flexure somewhat the curvature and figure of the mouth of a bell, very much extended or flattened.

Of the horny Heels.—As these parts well deserve a particular and separate consideration, from the other bearing points of the foot, on account of the embarrassment they create in shoeing, and require to be better known, so we shall state here respecting them, that the inner horny heel differs from the outer in being longer in point of extent backwards, and thinner and more elastic in respect to its horn, and much fuller or extending downwards below the level of the rest of the hoof; it is inattention or want of knowledge of this circumstance, and levelling the foot for the shoe as if both heels were alike, that often makes the smith lay his shoe closer to the quick of the inner heel than he is apprehensive of; and thus a bruise, tenderness, or corn

is the consequence. The provisions of nature to obviate the bruising of these tender parts are worthy attention.

The coffin bone on this account at the very extremity of the heels, is a little elevated, or the thickness of a ~~slab~~ removed from its underside; and by this means any violent pressure upon this tender point is avoided by its receding within the general level of the lower surface of the bone. The process also forming the heels of the coffin bone scarcely exists in young horses, but extends backwards and fills up the heels with the growth of the hoof.

The inner heel is sharper in its horn, and not so wide as the outer heel, and both slope inwards, in the full grown natural foot, with a rapid declivity, avoiding by this oblique structure any flat and direct pressure from the surface of the ground. By shoeing, these heels become very much reduced and flattened, so as that a flat-heeled shoe, or one whose upper surface is level, shall almost equally touch the bar with the side of the foot, unless previously a small portion of the bar be removed, as is usually done, though in the natural foot the bar lies so considerably below or within the level of the outside of the horny heel as to make this unnecessary.

To prevent any pressure on these tender parts of the foot, the smiths usually bevel, or slope the shoe inwards, which has been much inveighed against by various writers on these subjects, and considered as the principal cause of contracted feet, though those who thus complained and reasoned without the practice, did not know that horses, if shod differently, will not go so well, for seated shoes, level in this part, do not, as practice and experience teach us, so well suit the foot as those made with a slight inclination or bevel in every part of them, which preserves the horn also from cracking up in other parts of the foot better than a flat seated shoe; and as to the contraction of the heels, it arises from other causes, that unless carried to a very great excess,

excess, this bevelling will not appear to make so much difference as might be imagined, and this on account of the firmness with which the foot is held upon the surface of the shoe by the nails, aided also by the inequalities of its surface to which the horn adapts itself; for the heels it is obvious cannot have any great deal of action but in concert with the quarters, especially after they become stiff with shoeing.

Of the Bearings of the Hoof on the Ground.—It is a circumstance not devoid of interest, in respect to the foot and shoeing, and hitherto unnoticed, that the surface of bearing of the natural hoof is not, as might be expected, round the whole line of the inferior circumference of the wall of the hoof; but, that the horn of the inside of the toe, and the outside heel, take a greater share of bearing than the other parts, and as it were in the diagonal or crossways direction of the foot. The inside heel is also, as we have frequently before remarked, on a lower level than the outside heel, and giving thereby to the foot an inclination or bearing to the outside.

By this mode of meeting the surface it appears that the greatest firmness is acquired by the extraordinary width and distance of the bearing points of the base; at the same time the hoof is set more at liberty than it could have been by a generally equal bearing over every part of the circumference.

The inside heel, as being nearer to the centre of gravitation of this extremity of the body, which probably would fall in a perpendicular line between the two fore feet, would, perhaps, if not thus elevated, have an undue share of the weight, or with a less power of resistance, which by this elevation of the heel, is directed more to the opposite side,

side, or brought to an equipoise of bearing with the other heel; the pressure also by this obliquity of the two heels is thrown outward against the stronger parts of the foot, and tends likewise thereby to separate the feet; for if the same inclination had been inwards, the approach of the feet to each other would have been the consequence, and would narrow the base with certain inconvenience; the inner heel, also, is more at liberty for the exertion of its elastic properties by the diagonal point of this heel in the wearing point of the foot being removed wholly from the ground, and thus contributes still further to the freedom and liberty of every part of the hoof.

However perfect the shoeing art may at length become, it is hardly probable it will ever be made to imitate this natural bearing of the foot, and at present this is wholly sacrificed.

Of the Wear of the Hoof.—It is well worthy of remark, that this does not take place in front of the foot at the extremity of the toe, as might be expected, but almost ever in an oblique direction on the outside of the front: a double purpose, of the most useful kind, appears to be served by this; for a bare mention of the facts would have hardly any interest, unless we ventured to explain the causes of them also; which having suggested as they at present appear to us, we leave them for further research.

In the first place, the attrition and wearing away of the hoof does not proceed so rapidly, as it would have done had it gone on in a straight line across the point of the toe, from the foot being narrower there, for economy in this respect is of no small value to the animal in a state of nature, or if used without shoes; as is still the case in

some countries : secondly, the wear is thus turned towards the strongest and hardest part of the hoof, which, as we have before stated, is on the outside ; and the remarkable enlargement or bulge noticeable with this quarter or side of the foot, extends the wearing surface in a still greater degree, and will thus further prevent a too rapid detrition of the hoof ; this wearing part of the hoof, under some circumstances, as in dry and particularly in frosty weather, and in snows especially, will assume a polish and hardness, that is scarcely credible, so as to resist almost entirely the wear, or cause it to proceed with surprising slowness.

The wear of the hoof is directed obliquely to the outside of the toe, not by any mechanism existing in the foot itself, but by the bones of the knee having their surfaces for motion directed outwards, so that when the foot is off the ground, if put in motion it is obliged to follow this direction ; cutting or interfering with the opposite leg is at the same time also materially prevented by this construction of the limb.

Of the great Cartilages of the Foot.—The large and important share these parts have in the framing and mechanism of the horse's foot, and the strong corroboration they afford of the truth of the foregoing principles in respect to it, are inducements to add them to the parts already described, having as yet confined ourselves to the hoof alone ; so this will be the only part within it we shall notice, lest we tire by those anatomical details, to which we have before alluded, and which do not appear, when extended to minuteness, to have much use in assisting our views and understanding of the arts of shoeing.

On removing the hoof, these elastic cartilages are seen, immediately

diately beneath, ranging to a great extent along both sides of the foot: their figure is almost too irregular for a comparison; but, that we may entertain some notion of their appearance, we shall say they approach, that is, those parts which are seen on a lateral view of the foot, nearer to that of a lozenge, or a pretty fully expanded fan, than any other figure we can liken them to, fixed by its centre, (which is very much thicker and more solid than the other parts) as also by the lower edge of one limb, firmly to the side of the coffin bone at its upper part, lodged in a deep horizontal cavity or channel provided to receive it: from this central point of insertion, the *anterior portion* of it passing forwards nearly meets the cartilage of the opposite side in front of the foot, the great extensor tendon of the foot only separating them, with which they are connected and make a common surface: on its inside this extremity of the cartilage takes a strong adherence to the condyle of the coronet bone, and closely surrounds the joint this bone forms with the coffin bone, that the articulation appears without any proper capsular ligament at this part.—

The posterior portion of the cartilage ranging more largely and becoming thinner as it extends itself backwards, and more elastic, is gradually and inseparably mixed, towards the extremity of the foot, with the skin and the ligamentary elastic lining of those parts forming the extremities of the upper heels, and constituting the principal material for elasticity in these parts. Spreading also in an upward direction, a great height above the hoof it terminates with a rounded, thin, and irregular edge, inflected inwards over the soft interior of the foot, forming a roofing and defence to those parts.

Next this general and widely distributed cartilage passing downwards is observable, surrounding on every side the rough and knotty extremities of the heels of the coffin bone, entering and filling its sinuosities, and taking strong adherence to these processes, it now extends itself horizontally inwards, passing over the horny sole and bar, and meeting

meeting the side of the sensitive frog intimately unites with it, forming one inseparable mass, and together fill up the whole internal area described by the sides of the coffin bone. The upright or lateral portion of the cartilage forms with this horizontal process inwards, a right angle, thus making together a hollow space or receptacle at the back of the coffin bone for the spongy elastic stuffing of the heels, for the tendons, trunks of blood vessels, nerves, &c. passing this part for the supply of the foot. *The upper surface* of this horizontal process of the cartilage is full of scabrous elevations and depressions that defy dissection, and in which a gelatino-ligamentous material is existing, not of the density or consistence quite of ligament:—beneath or to the *under surface* of this horizontal layer of cartilage, the sensitive sole and bar are adhering: and in approaching the frog and centre of the foot it loses its cartilaginous nature, and becomes coriaceous or rather ligamento-coriaceous, agreeing in this with the internal frog.

This portion or process of the cartilage is of considerable thickness and substance, more so than any other part of it, though of a coarser grain, and a softer and more elastic nature; for the greater convenience of considering and speaking of it we have applied the name of *The Stratiform Process of the Cartilage* to it; both portions together communicate the general boundary and form to the lateral, the posterior, and inferior parts of the foot; and when the bars or frog are thrust upwards by pressure from without, they are then acting against this same horizontal flooring, formed by the cartilage and frog, and met by the depression of the bones of the foot from the weight of the animal; the whole can then dilate exteriorly along with the posterior and more elastic parts of the hoof. “ “

A perpetual shoe would soon be intolerable, but for the nature of this cartilage and the large share it occupies in the structure of the foot, it being highly elastic, and having as it should appear but little vascularity or sensation, which causes it to be less affected by it; and

and it is a circumstance deserving particular attention, whether in cases of contracted heels, the pain in reality may reside so much in them as in other parts, where there is more resistance, solidity, and sensation, as with the sides of the coffin bone and its coverings.

This cartilage is made to serve many important purposes in the business of the foot, and since the resistance of a solid unyielding body would have been inconvenient, it therefore on account of its elastic properties occupies as a substitute for bone, so large a share of the hind parts of the foot; for it may be remarked, the coffin bone, except by its extremities or heels, does not extend beyond the middle of the hoof, the rest of the posterior figure of the foot is almost wholly communicated by the cartilage, which passing round the whole coronary circle nearly, it serves to support and convey the skin to its lodgment in the coronary concavity of the hoof; its exterior surface also resting against it, and pressing it to the hollow ring, assists in preventing its dislocation by external assault, and enables it to follow the movements of the hoof. It serves to equalize pressure every where over the internal surface of the hoof, when under the impression of the weight from within during the descent of the bones of the foot, and, what is singular, the hoof itself is the most solid material of these hind parts of the foot. A more important office still remains to be exposed, if we can succeed in making it intelligible, that of supplying the coffin bone with a considerable share of its means of motion in the hoof: for it is to be remarked, that as the coffin bone is obliged to describe in its descent a small portion or segment of a circle at its back part, round its centre of motion or rather its more fixed part (for there is no part of it wholly fixed,) towards the front of the foot, so this could not be so well accomplished had the bone itself been fixed at its upper part to the processes in front of the hoof, these being too inconsiderable to afford in that part of the bone the extent of motion required, but by the intervention of an elastic cartilage

tilage between the bone and the surface of the hoof, which carrying the processes, the bone thereby acquires greater liberty for action and movement of its upper parts ; and again it may be observed, that below where the cartilages terminate there the *Reticulum* or web carrying the processes is very much thickened and enlarged, apparently that it might serve more efficiently the same offices, as will be found to be more particularly the case in front of the coffin bone, where the cartilage sooner becomes deficient than in other parts of the foot.

For this elastic web, which we have called for distinction sake, and that it might enter more into our consideration by having a proper name, the *Reticulum processigerum*, does not appear to us to be the periosteum of the bone merely, as has been hitherto imagined, but seems to pass down from within the skin, and is found to possess as much or more elasticity than the processes themselves, which after maturer consideration would appear more especially designed for enlarging the surface of adherence between the hoof and bone, and rendering by this means their connexion more secure than for any great extent of action that they possess : the hoof also where the strain is great can itself bend to the weight, destroying too sudden resistance.

We remark also, in terminating this arduous description of them, that the singularly small appearance which the coffin bone makes when compared with the hoof belonging to it, is occasioned by the extensive share of its upper surface occupied by these, widely distributed cartilages, the supplementary intermedia of the foot : which assume in their course an extraordinary variety of thickness and hardness according to the different parts they fill up, or service they have to perform, often becoming osseous in their more solid parts, and are then called *Ring bones*.—The *Stratiform Process* obtains more of the cartilaginous nature and solidity with advancing age.

SUCH appear to be the leading principles of construction in the foot of the horse in each separate part, and in the whole combined, as far as our humble reflections and researches have enabled us to consider them. It is these principles, when rightly understood, that can unfold the obscure and intricate effects of the shoe, and these alone ; for the shoe, from its nature, cannot in any respect participate in these properties of the foot, and hence the cause of its mischievous effects.

The assertion, at first, may appear singular to those who have not investigated these matters with a close attention, or viewed the chain of connexion of these things from the beginning of the services of the animal to his termination at the slaughter-house, through the different periods of his rapidly destructive course ; but is nevertheless true, that the shoeing it is, with its multifarious train of consequences, that for the most part has been the root of so many evils to the horse and to mankind, not only by its immediate operation on the structure of the foot, but by its entailed consequences in the use of him, which is so often rendered unsatisfactory, vexatious, and dangerous through it : for these errors in the management of the feet are ever visited with unmerited punishment upon the animal himself, in order to do away or overcome its consequences by exciting other feelings, though for the most part in vain ; and it is from this that the vehicles for draught are filled with all our best saddle horses, setting aside all considerations of humanity, which for certain reasons we purposely exclude from this part of our labours ; and it may be with truth averred, that such is the simple nature of the animal himself, and his disorders, exclusive of the shoeing and its effects, that there would be little room for the exercise of *knowingness* or trick respecting him by stable-men or others, if these effects were fully understood, or could in any way

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be removed ; and the dread many have for very good reasons of using horses, or having to do with them at all, would in a great degree be done away.

For let whatever will be said about these effects being known of the shoe, it is clear from the readiness with which people consent to have their horses shod at any age, on the first summons of the breaker-in of the horse, that they view the shoe merely as protecting the foot, and are not aware of its insidious effects ; nor do they afterwards exhibit the least jealousy or anxiety about it, but would rather, as we often observe, treat the proposition of its removal as a piece of inhumanity.

And we derive some consolation from one reflection on this subject, that even with a continuance of the present method of shoeing, a considerable share of the evil may be removed, and the rapidity of the destruction be greatly in all cases prolonged under certain regulations, though we must admit also there are some services or situations in using the horse, that do not appear to allow of much assistance : but this will be made the subject of future consideration.

In respect to the ass and mule, we may just state, that being of the same family the same general principles pervade their construction ; but as nature has denied to these the same fullness and luxuriance of form and make, so also the foot has not the same full developement of parts. The hoof in these is thickened, stiff, and hard, and appears to bear a greater relative proportion to the other parts of the foot than it does in the horse, that if shod there will be less suffering, as there is less of elastic parts to lose.

If what we have stated respecting the nature of the horse's foot be true, the effect of the shoe will be almost presumed without any demonstrative evidence ; but as reasoning may easily err, and imagination lead us astray, still the actual experiment, if truly related, will ever stand as plain matter of fact, that can neither err nor be denied ;
and

and the course of the experiment will also unfold a variety of matter for reflection respecting the foot, which would not properly attach to any thing we have heretofore noticed: We proceed, therefore, to the consideration of this first experiment on the effects of the shoe, in which the public, as far as they are interested in this important inquiry, and especially myself, are greatly indebted to the obliging conduct of Mr. George Hobson, both in providing the subject, and in allowing the mare on all proper occasions to be brought for examination, and the prosecution of these experiments; for next in every state to man himself in public utility will be what respects the services and true knowledge of this animal, and how we can best obtain and prolong the period of his services.

Experiment I.

In plate II. fig. 2. is the representation by the same eminent artist, Mr. Milton, of the foot of the mare, taken from a cast made June 18th, 1805, being exactly a year and nine days after the first application of the shoe. During the whole of this period the shoeing smiths, who were as steady men to the full as any others in their line, were left to the practice of their own art, without the smallest interference or control of any kind on my part. They were aware of the cast being taken from the foot, and were not less careful on that account in their attentions in shoeing her.

Let us now mark with precision the differences which have taken place, and see what have been the effects of fixing the foot without intermission for a period of twelve months to an inflexible iron ring, for such is briefly the fact with respect to the nature of the shoe, by whatever name it may be called; for the word *shoe* has had its fasci-

nation also in concealing its effects, by reminding us of the comforts we derive from our own shoes made of leather, and elastic to the foot, to which neither in the material of which it is made, or the mode of its application, has it the smallest correspondence; of such force are names that mere chance often confers on things in blinding our views of their actual nature.

The original state and proportions of the foot being before us, and perfectly preserved, we are enabled to make an exact comparison of its former and present condition; a diminution of volume throughout is strikingly manifest, but more so in the elastic parts. A mechanical hardness marks the appearance of it, in place of the flowing easy outlines observable in the original. The evident competency in the parts to their respective offices, which the eye recognizes in the former, is done away in this; and such is the general diminution of the foot, that actual lameness would naturally be supposed the effect of so much alteration unless explained, for this does not take place for the following reasons; that the parts have suffered their alterations slowly, and, from being in their nature yielding and elastic, have given way to the effect of the shoe, as far as the diminution extends at present, without much resistance; and above all, that during the application of the shoe the parts that have most suffered are not called into action, nor are their uses required, so that the foot by degrees assumes a new sort of existence, and gradually adapts itself, as much as a living part can, to the effects of the iron circle, and cannot afterwards do without it.

We now examine the nature and extent of these changes wrought by the shoe; first observing, that in drawing away this second impression we were surprised to find with how much greater force it was held and came away from the foot than the former cast did, and as immediately appeared from certain alterations that had taken place in the relative situation of the parts of the foot, as also from the slanting
surfaces

surfaces of the bars and frog having assumed a more perpendicular direction.

The elastic parts of the heels have lost their swelling, rounded, and beautiful appearance, by the sinking of the cartilages and the loss of the elastic matter within ; and the surface they now present is an ugly flat slope towards the base of the frog.

The horny heels, from one to the other, in the original state of the part, measured somewhat more than four inches ; in the second cast scarcely three. The foot measured across its widest part, viz. at the greatest swell of the quarters, was in the original cast nearly five inches and a half ; in the second cast it was four inches and seven-eighths. The actual length of the foot, we may remark, has not been much changed ; which seems to confirm the circumstance that the cause operating these effects had been lateral principally, and serves to evince its having been the effect of the nails.

The frog had lost, through its being wasted and cut away by the smiths, the rounded swelling and projection we have distinguished by the name of the *Cushion* ; and its lower surface, though its substance was so much diminished, was lower by near one fourth of an inch than the horny heels, or wall ; for it may be recollected, in the account we gave of the frog, that this part was then three-eighths of an inch within this level. This appeared to arise in part from the condensation of the horn of the heels, from the constant pressure of the shoe upon them, and also from the circumstances we have before explained at page 35 on the cause of this descent of the frog, which it will be unnecessary to repeat. The texture of the frog, from an agreeable yielding and elasticity, had become hard and unyielding to any impression of the fingers ; and its sides, which at first were gently inclining or sloping to the commissure, had become almost perpendicular. The *cleft* at the base of the frog had become partly closed, forming a rounded ill-formed hole, and much deeper than the cleft of
the

the natural foot. The base of the frog, which was in the natural foot of the width of two inches and a half, had now become hardly so much as two inches. The bars had considerably lost their sloping direction, and had become more perpendicular and encroaching upon the sides of the frog, and consequently more disposed to compress it.

The sole appeared somewhat more arched or cupped than formerly, but the degree of thickening it had undergone, as also the elasticity it had lost, could not be accurately ascertained in the living subject. Thus we see the beautiful and useful symmetry of nature's mould, no part of which is without its use, has been changed by artificial restraint to deformity and incompetence. Many there are who have added unnecessarily to the obscurity of these cases by confounding them with, or supposing them the effects of standing in the stable; which, in the next part, to set things in a more clear light, we shall give proof enough from actual experiment, that however inimical to the feet the stable may be, it is wholly incapable of producing such powerful effects as these, which can be shown most convincingly in two ways; viz. by shoeing, and turning the horse to grass, when the same effects will ensue; and also by keeping a horse unshod in the stable, which we have for years done, when no effects of this kind have taken place. The worst cases of contraction also, we may observe, are with stage horses, that have little standing in the stable.

No shoeing-smith or dealer would complain of the foot as it appears in fig. 2. *; though it is a wide departure from the model which nature has established for the foot of the horse. And so little has this fact been attended to, even by those better informed than dealers or smiths in these matters, that I remember some years back Mr. St. Bel, the

* The sides of the foot have been somehow reversed in this impression in respect to the former plate, the outer quarter of the foot being on the left, and the inner on the right hand side of the paper. In the remaining plates they are as in the first in this respect.

first professor of the veterinary college, sending forth to the world with his Essay on Shoeing, as a model of a perfect foot of the horse, one more diminished than this ; nor did he know that nature from the use of the shoe had suffered much change, nor did any of us studying at that time at the college at all suspect it, at least that there was in these cases much alteration of an injurious nature. If horses were brought there with contracted feet, as must have been daily the case, they scarcely obtained notice, from our habits of constantly seeing them in this state, unless they were attended with very great crippling and tenderness indeed ; for it is most usual with people finding defects of this sort to avoid the evil by parting with their horses, and to take as little notice of the fact as possible ; and many there are who stoutly deny there is any such thing as tenderness in the fore feet of horses ; and some there are who appear insensible of it till a fall convinces them of their danger, when they are apt to become as much too timid as before they were too confident. Horses of this description, it has been before stated, can still, after they are sold, be made serviceable ; for employ will never be wanting for the cheap horse as long as severe bits and a bearing rein can keep them up, or the thong can draw from them an exertion, for harness is the only resource while they last. And these defects of the feet were somehow or other considered as casually arising from a defective nature of the foot itself, or from bad shoeing, as it was termed : and in one sense this might be true ; for if shoes were fitted out very small with a view to *neatness*, as it is called, it would obviously accelerate the mischief in a greater degree than when a more liberal allowance was made in this respect, and which circumstances resting entirely with the discretion of the workmen, in no way, perhaps, suspicious of its consequences, would ever be a matter of uncertainty ; for the fact appears to be, that the finer the feet the sooner they are destroyed : hence the feet of blood horses are the first

to experience its effects, and to suffer. Our views on observing these obvious glaring cases of contraction were used to be confined formerly to the heels only, and the mischief was attributed, as we have stated, to some natural deficiency of the foot, to bad shoeing, as it was called, to bevelling the heels of the shoe too much, or want of pressure on the frog, or other causes of this sort, and immediately followed propositions for the futile task of expanding the heels again, &c.; and with the same intention the smiths would have recourse to cutting away the arch of the commissure, expecting vainly enough that the heels would then fly open! but which drying, contracting, and often cracking, only serves to increase the mischief,—the attempt at expanding feet so contracted having cost us more attention and expense than almost any other part of our studies and labours respecting the horse; so we shall give the general result of them on some future occasion. Indeed it was in making those fruitless experiments that we were first led to see the true nature of the evil: for it is singular, that those views of contracted heels were not at all accompanied with any right apprehension of the true cause and origin of the mischief; that it is very possible to see without perceiving things most obvious, and to perceive and yet not fully understand; so difficult it is to overcome preconceived notions, or entertain that which our suspicions are not awakened to.

Seen by itself, there are many now who would deny there was any contraction at all in the foot, No. 2.; and more would say it was not of the smallest consequence, because they had been used to see feet much more contracted: and as far as it extends at present it will not be so much felt as to be made sensible, by external indications at least, while the shoe is used. But that a defect, of an injurious nature to the foot, exists, can be proved even here; for by experiments in similar cases we have found, that by taking off the shoe, and using the foot only a few miles on the road, the foot will acquire considerable heat

heat and inflammation, that would not in the smallest degree have taken place in the natural foot ; and arising, as appears, from a deficiency of the elastic parts of the hoof, which, by pressure, or want of use, or both, have been condensed, and their uses in this experiment being again called for, the well-being and ease of the foot, painful sensations and inflammation are created by the want of them. For it is not from external resistance, as would at first appear, that this arises, for this it is evident will be more complete when the shoe is on the foot, but from painful efforts at the expansion of the different parts of the hoof, which the loss of the elastic parts does not permit.

Five years of unrestrained growth have perfected this foot beyond what is generally seen at the commencement of shoeing, which usually takes place on the second, third, or fourth year of the horse, and before the foot is nearly unfolded or grown to its size ; so that the great change that is here observable is more strongly manifested than it would be in ordinary cases of shoeing ; and the foot cannot be expected to exhibit differences so great and conspicuous in succeeding years as in the first, there being less of elastic matter to act upon. Nevertheless every year will have its effects, and will bring the hoof in closer approximation to the coffin-bone ; and at length we shall see that a partial diminution of the bone itself will be the consequence, with other derangements of it.

The horse, we may remark, like other large animals, is slow in acquiring maturity, and like them is not very short-lived. Some celebrated writers have considered the natural period of his life about fifty years. This was before the art of shoeing commenced, and may be not far from the truth in those times. If we were to give an opinion on this matter, we should state it as our belief, that he acquires his stature or height at about five years, but obtains his full bulk and strength about the eighth year ; and this period, as in most other animals,

animals, if multiplied by four, will give somewhere about the period of his natural life ; which without any desire of unnaturally extending, would be from thirty to thirty-five years ; and at the former age we have seen (setting aside the injuries of their feet) horses capable of a great deal of service. But the most remarkable remark is, that frequent visits to the slaughter-house, a useful school, but not much frequented, have led us to observe and conclude, that six arrive there before to one after the fourteenth year ! for they so early become cripples through the injuries of their feet, that it is found most advantageous to the interests of those who get these kind of horses that are daily becoming tenderer, to “ use them up ” by the severest measures, and most unnatural usage, rather than to endeavour to prolong their labours by preserving them ; and there is no want of supply through the causes above described, at least principally ; and it deserves a closer attention from the public than it has ever yet received ; for men, as we have before observed, have been really afraid to look into these things about horses, as though their affairs were somehow clothed in fearful and impenetrable mysteries.

Let us now quit these considerations for a more close view of the nature of the shoe, and how it produces these effects.

The first and most obvious evil of it will be its permanent application and constant pressure against the bottom of the foot, with a force altogether indefinite, depending on the strength with which the nails are clenched, and the proximity of the shoe to the sole, which causes it to act with more or less violence against the lower surface of the coffin bone. Next the nails in the sides being immoveably blocked in the perforations of the shoe, create a solid resistance of iron at this part, not admitting the natural expansion of the hoof ; and it must be obvious that they almost, though not entirely, prevent, by keeping the quarters fixed, every movement of the posterior parts and heels. To obviate this, the nails have been placed as much as may be in the front parts

parts of the foot and shoe, though in reality it was not so much the intention of those who recommended this mode of shoeing, to remove the nails from those parts on this account, as their being occupied with the mistaken idea of the necessity of raising the frog; and to obtain this, the shoe was designed to be very thin or low at the *heels*, (as in the shoes of *Launceston* man,) that by the ground meeting the frog it might be raised, and the *heels*; and the nails were in reality not inserted in the posterior parts of the foot, in order to give an opportunity for this operation of the frog. In examining the structure and relative situation of the frog, we have seen how little probability there is, that this softer and more retiring part of the foot, could be designed by nature for any such office; much less then could it operate with good effect after the nails had in any manner restrained the movement and dilatation of the wall under the weight of the animal. Indeed, the want of success attending all attempts to bring this shoe into actual practice, shews that the doctrine is unsound, though the defect did not before clearly appear.

The feet of horses that have been shod with the low-heeled shoe, we have remarked, have been kept very open by it; yet those who have used it have after a while almost universally abandoned it; preferring the usual methods of shoeing with a level or thick-heeled shoe nailed along the sides of the foot. This change, we apprehend, they were induced to make from experiencing a degree of sensation and tenderness after much exercise with the former shoe; proceeding perhaps, as might indeed be expected, from the unequal bearing and pressure on the posterior parts of the foot which such a shoe would inevitably occasion, and also from the strain and distension which the back sinews would suffer from a shoe lowered at the heels: to be indulgent, it ought rather to be raised than lowered, as is the case with our own shoes, the heels of which are always made thicker than any other part, and for the same obvious reason.

Though subject to the inconveniences before mentioned, a shoe of this kind will be perhaps the least injurious to the structure of the horse's foot of any of the shoes; and if applied or adopted with more care than is usually done, producing pressure on the frog, it might perhaps be more useful than it has ever heretofore been; and it may be resorted to in young and growing feet, where it may be resorted to in the stage, if no better means for protecting the foot can be devised.

Nor are we disposed to attribute the open condition of the foot when this sort of shoe is used, to pressure on the frog, the cause usually assigned, except in a very subordinate degree: we should rather consider it as arising from the opportunity which this sort of shoe affords to the oblique surface of the bars themselves to come in contact with the ground: these by their structure and direction, sloping downwards and outwards, present interiorly a more solid and proper surface to the ground than the frog, for dilating the posterior parts of the foot. The frog it will be obvious also contributes its share, though in an inferior degree, admitting rather of these movements than producing them: for we must not be misled by the appearance which this part makes in shod feet, as it always hangs considerably lower than it will be found to do in the full-formed good natural foot. But the preservation of the form of the foot by this kind of shoe, is to be attributed more than to either of these causes, to the almost perfect liberty in which the quarters or sides of the foot are left by the non-insertion of nails into them: the weight of the body

• To make this sort of shoe answer best the purposes designed, we apprehend it should be made of steel properly tempered, and not of iron, as it may thus be made thinner and lighter, and be even more durable than with iron: it also might from its thinness be in part or wholly let into the hoof in front, so as not to disturb the natural course of bearing of the foot on the ground.

then

then maintaining that movement which will preserve entire the figure of the foot.

This discussion on the shoe is rather ~~extraneous~~ ^{rather} ~~than~~ ^{the} the object of our present inquiry ; belonging ~~to another~~ ^{to another} chapter of this work, where we shall consider ~~the reasons~~ ^{the reasons} of their preference : here we propose ~~to show~~ ^{to show} the mischievous effects of the shoe.

The nails driven by violent hammering into the square perforations of the shoe, are lodged therein so firmly as to form with it a solid mass, wholly preventing any movement of the hoof at the parts where they enter, and at some distance from them ; the quarters being held in this fixed state, the rest of the hoof is also robbed of that motion which is necessary for the healthy existence of the foot : being thus held for months and even years in a constrained state, it becomes stiff and inelastic, then diminishes in size, and a train of effects ensue which we shall more fully consider hereafter.

This elastic movement and dilatation of the hoof will admit of being not inaptly exhibited by comparison with the ordinary movements of a bow for shooting arrows, having under the weight of the animal an evident motion of this kind. Bows also are brought, we believe, from the eastern parts of the world, which are occasionally seen in the museums of the curious, and whose ends or extremities are inflected or turned inwards towards the centre of the bow, and afford a further illustration of the structure of the wall of the horse's hoof. It is clear also that if a bow be firmly confined at one or more points along its extremities, it will lose the power of motion, and will become more perfectly fixed, as these points are placed at a greater distance from the centre ; the nails passing through an inflexible iron ring into the hoof, in a similar manner, will make the hoof a fixed machine, attended with varying degrees of restraint, depending on the size and form of the shoe, the direction which the nails have taken in
their

their passage, as also their number and size: which being left to the discretion of the workman, or rather, to his simple apprehension, of the structure and properties of the organ, leads to much uncertainty and abuse.

and bevelling the upper surface of the hoof, and reducing the anterior circumference of the hoof to bear alone on the ground, when the whole weight is resting, and which if the hoof be not very strong, will sometimes occasion it to bend in near its middle region, or in others at the coronet, creating a contraction of the hoof about these parts: the French term this malformation *encastelé*, for which in English we have no name that I am acquainted with. The natural bearing of the hoof is a very broad and extensive one, and quite different from this. The clenching of the nails will also sometimes create an impression or sinking of the hoof at that part.

Horses about to be shod are usually led from the dry stable, and in this dry and hardened state of the feet the iron is for the most part applied to them.—It is also to be remarked, that the shoe is affixed to the foot while from the ground, and free from any weight; and is then consequently in its least extended state; a circumstance that tends to accelerate its evil effect.

Not should it be forgotten, that the nails when driven into the substance of the wall, distend it, like wedges driven into wood. It is equally obvious that they will always remove a portion of horn from its situation equal to the bulk of the nail, the impression of which will be partly lost by the condensation of the horn surrounding it, and partly by the dilatation of its substance; and this dilatation will take place chiefly towards the inside of the hoof, from its being more soft and less resisting than the outside: it is true, this effect of the nail where the hoof is large, or in feet that have not been diminished or impaired by shoeing, as in the fresh feet of young horses, will not be much felt; but

but in feet trimmed pretty close, or pared small for neatness, or to prevent cutting; or where the hoof is so small that there is a necessity for nailing above the part where the hoof is thin, various degrees of compression and tenderness are produced.

There is in these cases no yielding of the hoof to the shoe, so that if the shoe be irregular in shape, it will draw the horn after it; and if the nail should bend in its passage through the hoof, it will have the effect of compressing it. On examining the hoofs of horses after death, we have frequently observed ribs of horn running in a perpendicular direction and bulging towards the inside of the hoof, the obvious consequences of nails that had been driven too close or had bent in their passage: an inconvenience which at times cannot be prevented even by real skill and care.

After the hoof has been pared so as to satisfy the smith, we generally see him make the shoe somewhat less; and after it has been nailed on, the projecting horn is rasped, or cut away with the knife. This, it has been said, is done to prevent the foot being too large, to prevent cutting, or for neatness: it certainly will too frequently bring a compression to the interior more than it ought to be; and cutting, we have been well satisfied, has on many occasions proceeded from the benumbed state of the foot more than from its size, of which we shall give some striking proofs hereafter.

Another circumstance unfavourable to the shoe is, the constant advance of the hoof forwards by its growth, the narrower parts of the shoe are consequently carried forwards to the wider parts of the foot, creating a degree of compression at these parts: and at times we see the shoe buried in the horn of the hoof which hangs over it: for the hoof is not perfectly cylindrical but has a slight admixture of the cone in its shape, widening downwards in its growth, which the shoe resists.

It is also a fact that cannot be denied, that by shoeing the feet of horses, which are then expanding to their full size, not only the evils arise that attend shoeing, but there is a partial arrestation of the growth of the hoof, so that frequent disfiguration also ; so that whilst the hoof is increasing in bulk and weight, their feet placed in bonds are diminishing in size and fitness to support and move them.

It is a circumstance certainly of less moment than some of the preceding, although not to be passed over in silence, that the foot, with the shoe placed upon it after the usual custom, is much longer at the toe than the natural foot, creating an unnecessary purchase on the back sinew, which tends to embarrass the movements, and strain and fatigue the limb. If we attend to the natural hoof, it will be found that this wearing extremity of the hoof on the outside of the toe is short and removed, forming an obtuse, broad, blunt surface, which can occasion no impression or strain on the limb : the shoe, it is true, will, when nearly worn out, assume this figure in some degree ; but we propose that it should possess it on its first application. This suggestion however we leave to be determined by experience.'

It is matter of regret that not only the principle of the art is defective, and especially obnoxious to the young and growing feet, but unfortunately the practice of the art is peculiarly exposed to abuse and accident ; being a laborious employment it is necessarily occupied by men of little or no education, who after a short time become strongly prejudiced, and commit errors from misconception and a defective knowledge that make the practice as much or more destructive than the principle. A brief enumeration of some of these errors may not be without its use : preceding writers have strongly inveighed against the practice of burning the feet, and formerly perhaps, with justice ;
but

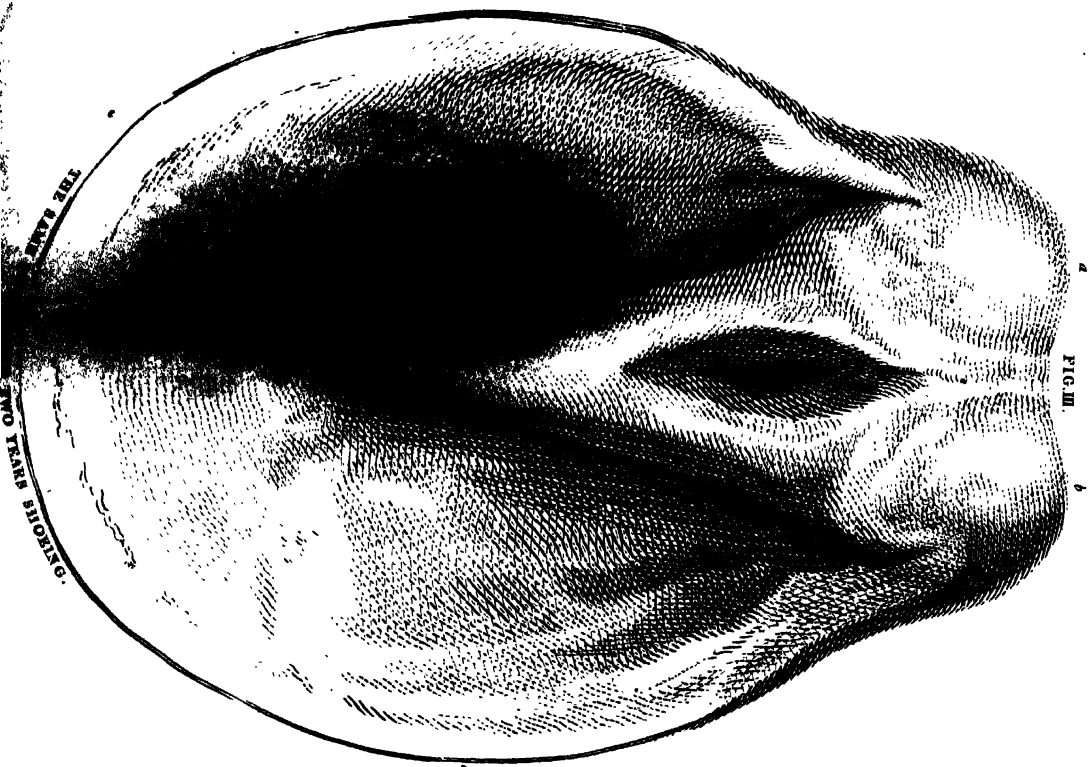


FIG. III.

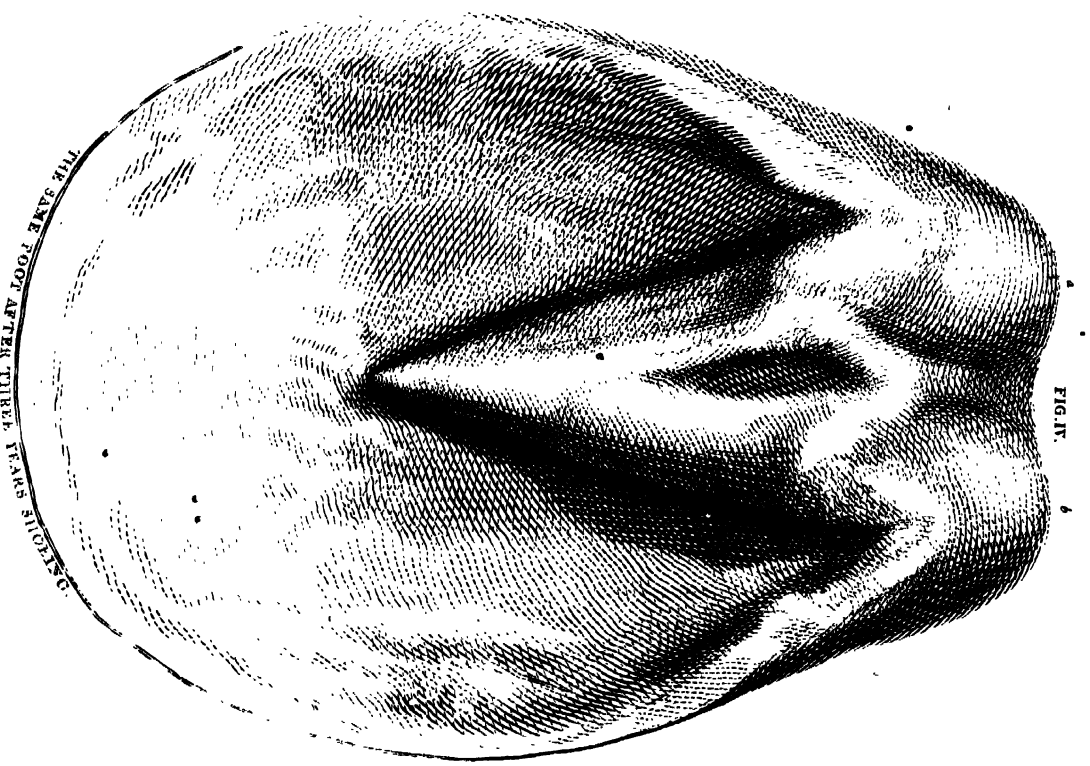


FIG. IV.

Pub. by H. Clark College, Street Tan 1910

but at the present time we do not recollect that there has been much mischief from this source, and we are apprehensive that the mischief now conceived as arising from this cause should be ascribed to the general principle: in cart-hoofing, it is a considerable saving of trouble, and a dangerous practice; with nag horses it should never be permitted,—more frequent injury is done by heavy and ill fitted shoes or too straight on the sides,—or with irregularities and roughness on their upper bearing surface that in tender feet may come in contact with the circumference of the sole or rather that part the smiths call the *vein*, a tender vascular part circumscribing the sole.—The toe or front of the foot is too often left of an unnecessary length;—the most frequent evil of all is from pricks or stabs of the nails by their taking a wrong direction;—the nails too large splitting and tearing the hoof;—rasping away the very useful cuticular covering of the hoof is also an ordinary error:—on slicing the frog, and the other injurious practices, we have already given our sentiments.

We shall now quit these considerations, to contemplate the effects of the second year's operation of the shoe, which is exhibited in PLATE 3. Fig. 1. engraved also from the actual cast by the same excellent artist. The increasing rigidity and stiffness of the hoof is more strongly manifested, the quarters are more straitened, and a further reduction of its bulk of near half an inch has taken place. The cleft of the frog has become narrower and more lengthened; the foot has run out or increased at the toe, as though this part, from having no restraint, had increased at the expense, as it were, of the diminishing quarters and heels, being further in extent before the point of the frog. When an impression was taken, it was always done on the removal

removal of the shoe, and before the foot was pared, that it might appear as if it were not narrower than was real. Certain shoes perfectly serve the designs which require a particular construction ; for where no superfluous material has been given, nothing, it is obvious, can have a prejudicial effect.

If the hoof is diminished in its diameter, or has become of less area, the softer parts within will be brought into closer contact, or be absorbed ; which condensation or loss, must be followed by sensations to the animal which it would be difficult to define or ascertain ; we should be reasonably led to expect a degree of numbness from the compression, attended with faintness or dull aching pain.—An impeded circulation will be one of the obvious consequences ; and whether the elastic processes are injured by being compressed from a diminished area of the hoof, is not easily ascertained ; in very old cases we have thought them paler than the natural ones and not so broad.—That this compression in the latter stages of shoeing—it is attended with severe suffering and pain, whatever may be the degree of feeling in this stage of the business, for certain it is that neither the spur or whip, however severely inflicted, will make the animal for many minutes together put out and use his feet to the full extent of their natural action or set them fairly to the ground.

If now any thing unsafe or disagreeable begins to be experienced the rider will be led to suspect that idleness or carelessness is the cause, or weakness of the limbs, or that the horse is somehow *not well* ; and finding that chastisement does not long avail, or prevent him from tripping and being tender, and unacquainted with the actual changes which have been going on in the feet, and considering the shoe as a natural defence, he will attribute his difficulties to a variety of causes neither of which may be the true one,—he may become desirous of investigating and obtaining a knowledge of the shoeing art,—its abuses
and

and errors will strongly arrest his attention, nor will the slow and invisible agency of the shoe upon the foot ~~possibly~~ become a matter of observation:—seeking information ~~from the~~ he will perhaps be first recommended to try *good shoes*, and ~~then~~ to some more knowing limb of the business, ~~who~~ shoeing all his life must know the thing well,” and ~~when~~ expected by some cunning trick or device to rescue him from his difficulties; but in this he may be disappointed:—harness is the next resource, a proper vehicle is provided, his tenderness is surpassed by measures I shall not describe, and girded to the bearing rein he is compelled at all events to perform his allotted work.

In horses where the foot is large, coarse, and the horn very strong, the contracting process may go on yet further and not be much felt, especially by a rider that has been long accustomed to this malady, or has had more tender subjects to deal with; or if his hand and seat be not very sensible to what is passing under him, in which respect there is a surprising difference amongst men; or by assiduous attention to the animal and the ground he passes over, its inconveniences may pass almost disregarded.—The natural courage of the animal in bearing pain that has been slowly induced, and to which he has become accustomed—the fear of punishment—and the rewards of delicious food looked for at the end of his labours, all tend to make it the less perceived, and the pride of not admitting a defect shall occasion even the existence of it to be denied.—On the other hand, if the hoof be small and closely embracing the foot, the horn thin or very hard, as is particularly the case with blood horses, and if the shoe has been early applied, then these evils will be operating with their greatest severity, and at a very early age he becomes a cripple, and is brought to the destructive measures we have mentioned. At five and even four years old, I have frequently seen horses from this cause incapable of taking more than half steps, and going in the greatest

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pain

pain and misery, and with difficulty kept on their legs ; in tripping he perhaps falls, when it is quaintly said by the grooms that “ he has *thrown* his horse.” Sometimes happens he falls with the groom himself. “ a poor tumble-down devil, not fit to ride, and then a fearful thing it is to put a poor fellow on such a *dog-horse*,—~~that is~~ only fit for harness or in reality the dogs,”—though perhaps just before purchased at a high price and by his own recommendation.—Or still another course of events may occur, and such an accident as the above may have been brought on suddenly by a tight shoe or a nail driven too close ; he may fall in consequence and be sold on this account ;—the nail removed and a shoe better fitted shall relieve him, and he may pursue the ordinary course of other horses for several years without a similar accident.—Such casual circumstances tend to obscure and embarrass what otherwise would have been almost natural and easy inferences in respect to the feet and shoeing.

Or it may happen in these cases where complaint is made of bad going and tenderness, that the smiths will have recourse to the only or almost only resource they have for giving relief, and this is the operation which they are pleased to call “ throwing open the heels,”—a phrase which mightily fascinates, since it is the very thing that is wanted. For though the expression itself is a mere delusion, yet relief is often obtained by the measure, for it is clear on inspection that the heels are not wider after the operation than before, nor are in the way to become so, but a fallacious appearance of width is communicated by the divided parts appearing at a greater distance. This operation and what we apprehend is the real cause of its relief is of sufficient importance to deserve a particular description : it is thus performed :

We may observe that the horse’s hoof, at its inflexure or posterior extremity, is projecting to a sharp solid edge or angle of horn, bending
inwards

inwards towards the frog, and in the collapsed or contracted state of the foot this part is resting against the side of the base of the frog, compressing and almost cutting it; the sharp horn is removed by a slice of the buttress, and a piece is also removed from the base of the frog; a notch in these parts, and it is usual to see a deep incision in the thick bulbous horny envelopment which the frog bears over the hoof at this part, forming the *arch of the commissure*: after this, the horn forming the sides and bottom of the reverted arch of the frog is also unmercifully sliced away, and as we have shown in treating of this part (on grounds not before considered) without just reason; for we apprehend in these cases of shod feet that the hard horn can be better spared from the inside of the bar as it is the encroaching part, and from its strength, being united to the sole, can better admit of it, or a small portion perhaps from them both may be better, so as not to weaken either in too great a degree.—The sole is then very much thinned with the drawing knife:—the effect of all this cutting is, that the foot is not actually wider than it was before, or likely by these measures to become so, but a temporary release is obtained from the pressure of the encroaching horn, and a degree of elasticity which is natural to the part is once more communicated to the foot.—If the shoe is now applied and adroitly fitted and nailed, a great relief will be experienced, and abundant applause may attend it.

It is however but a temporary resource, and will in its consequences with most feet at least be ultimately ruinous, for it is obvious that this proceeding does not at all extend to the cause of the evil, without which no permanent advantage can be expected; the horn robbed of its harder exterior coat, and the interior more succulent one exposed, quickly dries, and in drying contracts and pinches or compresses the parts beneath, or perhaps it cracks, as is too frequently the case in particular between the inflexure of the hoof and the frog, separating

separating from each other these parts united by nature, and admitting air, wet, and dirt through the opening to the quick, which from this exposure ~~renders the frog~~ and pain and tenderness ensue, rendering necessary ~~the use of the frog~~ have before stated of working them up; or the frog ~~may become~~ very quick shall become ulcered, or the frog-stay ~~may become~~ a thrush, and render the frog unfit for its offices; until the animal, no longer capable of being made to work even by the severest abuse, is led to the slaughter-house, which, by removing the object, is ever ready to cancel all errors.—It may however happen, and frequently does, that instead of even a temporary relief the very reverse is experienced, and he who by his boasted resources was expected to mend only makes bad worse, by not understanding the application of all the measures necessary to make it succeed; or the want of success may proceed from the foot being in a state that does not admit of further relief by these means: whichever way is pursued, it is usually found that year by year the horse is becoming on the whole more a cripple, and the owner, either with or without having had accidents, in order to get rid of the evil and avoid further inconvenience is induced to part with him.—But with the horse himself it is otherwise; at each remove falling into worse hands and a more base and distressing service, he is prematurely destroyed; and this happens most frequently before his bodily powers, that is, if duly supported, are materially impaired, or ought to be at least, for it is before the half of the natural period of his life is expended.

There are feet, it is true, that withstand the influence of these measures much better than others, and resist these evils for a longer time: a strong, capacious, foot,—a slow, uniform, progress of the contraction, and good management in the rider, may prevent his coming to harm; but in a general way it is undeniably otherwise, and especially with our finest blood horses and horses for the saddle where the
greatest

greatest perfection in the provisions and symmetry of the natural foot is observable.—Nor in such situations has the experience of the rider, however long, afforded him any assistance for solving his difficulties, or enabled him to warn others how to escape the evils he has had to contend with; and the traveller's tale after a most aggravating and perhaps painful experience in these circumstances has been—"that horses are by nature troublesome and uncertain things, and are attended with difficulties that are not to be overcome." And it is remarkable that in the case of crippled horses, coachmen, smiths, and jockeys often assume an air of consequence and an affected knowledge, or rather knowingness, about the nature of these evils, though in reality they never could comprehend them or their causes; and, far from shame, take a merit in the very mischiefs and difficulties they have created without knowing how, though they often know how well enough to turn them to their advantage by recommending a frequent change.

Some, in order to avoid the evils of tender feet, ride furiously over the ground, believing the danger to be greatest in going slow; and though in one sense this may be true, yet the miserable accidents which at times accrue from this expedient exhibit sufficiently the imprudence of such a dangerous alternative, that it is not by such measures these evils are to be conquered.

We now propose to consider the third year's experiment on the foot of the mare which then appeared as represented in Plate 3. fig. 2. and it will be remarked that the foot is somewhat larger than it was in the year preceding; for in the engraving a rigid adherence was observed to the actual state of the casts.—The reason of this unexpected difference we shall now explain;—the possessor of the horse, somewhat alarmed perhaps for the first time at the effect of the iron and the

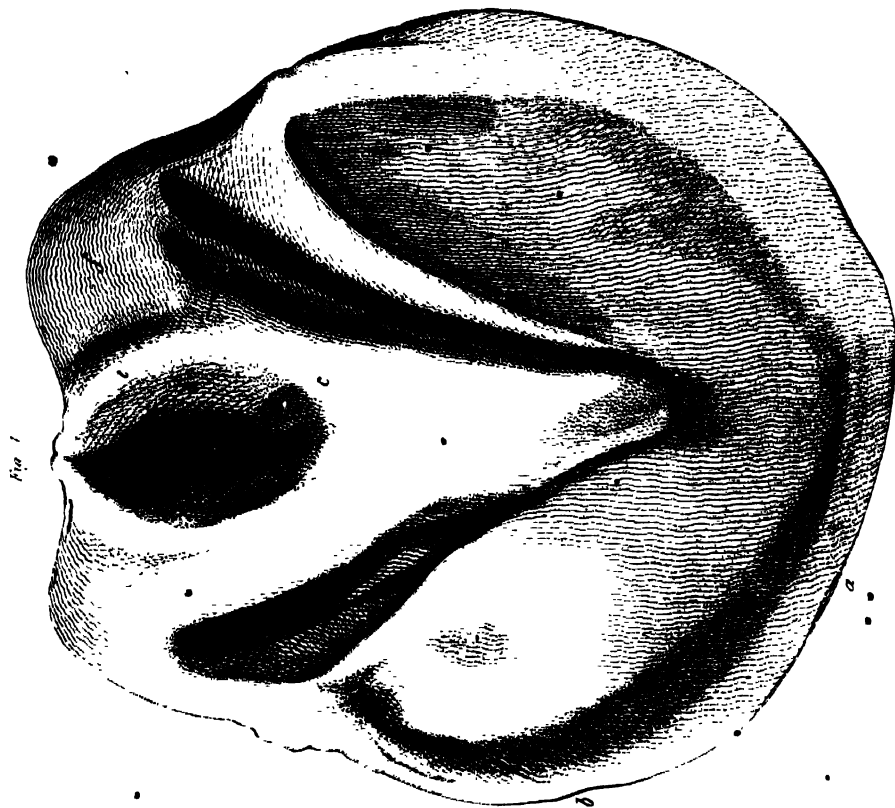
change the foot had undergone, which had been fully explained and pointed out to him. He was directed to take off the shoes and turn the mare to grass, and was allowed to prevent the further progress of the disease by the use of the shoeless defect. The effect of it was to communicate the hardness to the frog and prevent it from interrupting for a while the regular course of the experiment. We at one time proposed to turn this circumstance to advantage, in recounting here the curious result of our experiments on the restoration of contracted feet by this means of removing the shoes and turning out; but we choose rather to introduce them under a more advanced stage of the contraction.

As this unexpected interruption to the experiment prevents any direct conclusions, we shall in this place state to the reader the interesting result of the experiment which is given in Plate 4. fig. 2. an experiment on a new subject, made purposely to examine and remove one of the hitherto apprehended causes involved in this contraction of horses' feet, and tending much to obscure and perplex the notions entertained of it; for the influence of the stable has been on most occasions, as may be seen by the writings of my predecessors, thrust in to account for this malady.

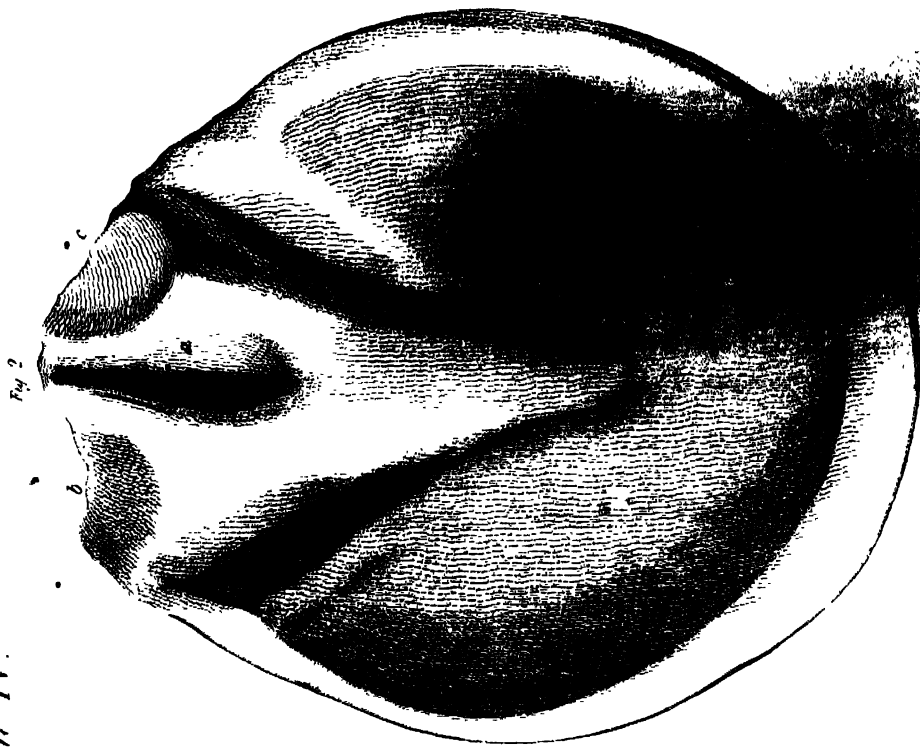
A coarse, ordinary, gray mare, five years old, was purchased for this purpose of Mr. L—sh, a distiller, in Holborn, who informed me he received her in part of rent from a tenant in the country, and that she had never before or more than once been shod, which her feet indeed sufficiently evinced; the form of one of her fore feet is seen in fig. 1. and the amplitude and almost exuberant strength of the furcaceous parts is remarkable*. A cast was made from the foot in plaster of Paris, from which

* The horse's hoof appears to receive or to be imprinted in its formation with very different characters, as to the relative proportions of the two leading parts in its composition: in some feet the wall and its continuous parts are particularly strong, with

— *Shute II.*



Expt. 2. On the foot of a young giraffe. Wee given $\frac{2}{3}$ of the rest, viz. — The Furcacea or prothoracic
have the ascending in the structure of this foot or are disposed large & strong & the line of wear
is in the middle of the outer quarter of the foot & forms a margin of the bulge of the foot & foot



The appearances of the same foot prints were also observed at the Mare having been during this time of low water level, as shown by the CDg.

extraneously denigrating the evidence presented

F. Douglas-Jones "Sci."

which the engraving was made, and which gives an exact expression of its features.—After a cast of the foot had been taken, she was shod and then turned into a grass field near [redacted] that I might observe if this contraction [redacted] take place without any influence of [redacted] near a twelvemonth, was as seen in [redacted] heels from the loss of elastic matter, and [redacted] in and following it, are not at all exaggerated, as might perhaps be otherwise apprehended: this more than ordinary diminution of structure in these parts will be readily accounted for from the redundant size and fulness of these softer parts in this foot, as we have before stated.

By another experiment also, the converse of this, we are led to a similar conclusion.—At the St. Ives autumn fair of 1808, in Huntingdonshire, I purchased a chesnut mare that had been very little shod (my express object in this journey being to procure one of 3 or 4 years old, that had never been shod, but which I found impossible, so early with us are horses usually shod,) ; this mare came the nearest to my purpose of any I could find ; and I learnt afterwards that she had been vicious in breaking in, and had been turned out to grass for a twelvemonth without shoes, that she might forget her vicious habits and the ill treatment she had received.

with a frog not in the same proportion ; in others the frog, with its continuous parts, will be found pre-eminently strong and full, assuming as it were a power at the expense of the wall, which is not stout in proportion.—The frog-stay also, we may remark, in some feet appears completed at the third, and in others not till the fourth or fifth year.—Again, the upright or mule-footed horse appears to have a distinct and almost opposite form and qualities to the flat and low heeled foot, communicating such different properties to the foot, as not only to alter its appearance, but greatly to interfere with the regular uniformity of the effect of the shoe. The dull almost wooden structure of the wall, flattened on the sides, with little or no elasticity, is also a character particularly to be observed in the ass and inferior animals of this tribe. The perfection of the foot of the horse would appear to consist in a symmetrically distributed and duly mingled power of each of the above parts.

I pur-

I purchased her and led her from St. Ives to Huntingdon, to my friend Mr. Baines, who kindly interested himself in assisting me in the management of her in London.—By gentle treatment she acquired her vicious habits, and I continued to make experiments on a new mode of shoeing, and she stood exposed in every respect as horses at liveries, to the litter and dung of the stable ; and though so situated, her feet grew both larger and rounder instead of diminishing, as would have been the case had they been confined by the iron. That I might more accurately ascertain the truth of this, I took occasional casts in plaster of Paris, but have not deemed them of importance sufficient to deserve being engraved for the work.

That the stable is in no way ever inimical to the feet it is not our intention by any means to assert, but we are only desirous of exhibiting proof that alone it is not sufficient to induce the contraction that has been apprehended.

It may be urged that feet often contract in the stable and without shoes ; this we readily admit, but its explanation appears to be that a disposition to contraction has been previously brought on by shoeing, and which afterwards can proceed without the operation or continuance of the original cause.

Having brought greater clearness into our views by the removal of this generally apprehended source of contraction, we now return once more to a consideration of what the original experiment unfolds respecting feet.

Let us now consider the well-marked cast of the year 1808 ; that of 1809 and 1810 being also presented on the same plate.—The dotted lines serve to exhibit the otherwise concealed outlines of one side of each foot.



Ossified Cartilage.

The area of the foot in its transverse diameter is seen further diminishing, and the condition into which the foot is brought by this reduction has brought the foot will occasion less resistance to the change to be now more severely felt.—The horn is crowded into a close embrace to the sides and posterior parts of the hoof, and the horn, being inactive, creates a resistance also in the direction of the growth of the hoof, and the elasticity will occasion the movement of the hoof, and the hoof, and of the hoof itself, to be diminished and constrained; the vascular organization uniting and attaching the hoof and bone together becomes diminished and its functions impaired, and prepares the way for *Founder*, and other morbid affections of the foot allied to this disease.

That the word *Founder* may be clearly understood, as it is often vaguely used and applied to any affection of the feet which prevents the proper going of the horse, so a brief description of this singular disease will remove all difficulty in this respect, as it wants a more definite application than it usually receives.

The foot of the horse not unfrequently has its connexion with the hoof weakened or wholly detached.—The coffin bone dislodged, or its adherence impaired, it is pressed down by the natural operation of the weight of the body, and sinking till it meets the sole, it there rests, with its front parts bearing on the horn of the sole, forcing it downwards and outwards in such way that this part, from being naturally concave, becomes of a flat or a convex form:—the horse is then truly enough said to be *founded* or *pomme-footed**.

Many appear to be the varieties or gradations of this sort of affection in feet, and the disease may be formed by a gradual chronic process, or suddenly and at once, as in a few hours.—Cases within our practice have occurred, where it has happened, after violent exercise or exertion, and the body has been considerably heated, that the foot has

* From *pomme*, (Fr.) an apple—not pommet, pomed, or pumice, as we see it often written.

been suddenly chilled by the imprudent application of cold water ; a most destructive inflammation has ensued in the vascular tissue and apparatus leading to the hoof ; these parts being surrounded and confined by the horny hoof, through which, as it could not penetrate, it takes a course to the top of the hoof, and with dreadful bursting bursts its way out at the coronet, lacerating and destroying the texture of these parts. Nor 'is it in these cases the usual process of purulent suppuration ; but a red watery ichor escapes from the vessels, and rends the texture of these parts in such way as to give them very much the appearance of a torn sponge ;—and with the sole also it sometimes happens, after such sudden chills, that a destructive inflammation follows, and the vessels rupturing pour out their lymph or blood between the vascular and horny sole ; which, softening the horn, it is presently, with dreadful suffering, forced from its place, and descending is reduced to a convex form ; and if the attack has been vigorous, it may bring the foot into this state in a few hours, or it may be that a mitigated attack may happen, not dislodging the bone from its place or forcing the horny sole, but producing various partial derangements of structure in these connecting parts of the hoof ; and we have seen callous enlargements of the bones and thickenings of the cellular texture, about the coronet, to arise from this cause, and in a less degree from mere fever or heat induced in the foot, and the waved, the crooked, ribbed, wrinkled, incurvated, and otherwise deformed hoofs appear many times to have their origin in affections of this sort. All we wish to observe in respect to the operation of the shoe is, that if it weakens in any manner the attachment of the hoof to the bone, it prepares the way for such complaints as these ; and they will then arise on the application of slighter causes than would produce them in the healthy sound hoof.

The frog, we see, has become reduced to little better than the half of its original bulk ; being a reverted arch, and soft, it has yielded
and

and given way to the impression of the bar, without any great resistance, as these have to the iron.—The cutting its exterior figure is wholly changed, and an *angular* figure is given it : its texture is stiff and hard, and, *the frog-stay*, has rendered this part obnoxious or exposed, and in the following year it will be seen to take place in the rupture or breaking-up of it, being now sufficient for its production, if any circumstance should arise to disturb it.

It cannot, as the mare is still living, be ascertained in this particular case ; but it has been found in several that we have examined at about this stage of the contraction, that the cartilages had begun to ossify at their base or insertion into the coffin bone ; and this it would appear has taken place from the confinement and want of motion of the hoof that should give due tone and health to these parts : it is the posterior half of the line of its insertion, we observe, that more particularly becomes ossified in these cases.—In cart-horses the ossification of the cartilages, through their whole extent, is remarkably frequent, naturally ; and this occurrence gave us formerly some embarrassment to account for. The above circumstance seems to show that want of freedom of motion in the hoof will induce this formation of bone in the cartilages ; and the cart-horse's hoof being of a thicker and stronger nature, and not having that elasticity natural to horses of a middling size, it appears to explain the cause of the occurrence of this complaint so often with them.

And not merely the cartilages are affected, but what has not before been much suspected ; we shall clearly show that the coffin bone itself is suffering and diminishing under the impression of the iron in a manner that is very remarkable, its beautiful exterior and richly organized surface being obliterated.

From this condensation of the foot, and the morbid processes accompanying it, we have an increased heat of this part and a more rapid

pid departure of the moisture and perspiration of the hoof, and which contributes, by the dryness it creates, to a further aggravation of the evil.

Flat-footed horses are so sensibly to feel these effects of the shoe; and the defects of their nature appear as increased and relieved by contraction, so these longer sustain its impression, and with less injury than other horses. The heels, however, of such feet, from their weakness, are apt to feel the iron, and the pressure of the shoe will by bruising these parts more frequently give rise to corns in them.

The foot is now greatly changed, and in a condition for the attack of a variety of disorders, its diminished bulk and increased hardness cannot but be accompanied with pain and its consequences.

We now advert to the 5th cast or impression made from the same foot of this mare in the month of June, 1809. Formerly it was stated that contraction of the foot is not sufficient alone to produce the thrush, since we see the most contracted feet free from that disease; yet contraction prepares the way for thrush, and certain casualties arise which excite it. A diminished and brittle state of the frog, from contraction or a thinness in the horn covering it from its being too closely pared, will render it liable to be broken by collision or impulse against the stones; or even great heat alone in the feet, proceeding from a feverish state of the body in consequence of too strong or too much food, and want of due exercise, will all of them induce a thrush at this weakened part; or exposure to wet, occasioning the remaining weakened horn to rot, will induce it. From one of these causes, and we apprehend chiefly the latter, the thrush has actually taken place in the foot now under consideration. The condition or appearance of the foot

strongly

strongly marks the wasting and impoverished state which a thrush, and the loss of the frog-stay, produces; the more, sharpened appearance of the heels is very striking; and, as the frog has suffered more than the other, probably being more cut and denuded by the knife: the bar, which surrounds and incloses the wasted base of this side, which would ill bear even the pressure of the thumb, much less the weight of the body of the horse in passing over any irregular surface.

The compressed sides of the hoof and the lengthened appearance of the toe and heels, have now brought the foot to a sort of parabolic figure, from being round and bulging laterally: the frog, from an elastic broad and nearly triangular form, is fast assuming the figure of a man's finger; its centre, wasted by the thrush, and its sides collapsed from the pressure of the bars, as these have previously, from the resistance of the iron to the expansion of the foot:—so the foot, now exposed without the shoe, would become as painful, or more so, than if kept in the fixed state to which it is accustomed. This is seen when the shoe is taken off or lost on the road, and the horse obliged to travel even a small distance without it, for he then goes lame; and hence the great utility and necessity of the shoe to the foot would be established in the opinion of the public, and occasion its imperfections to be overlooked: indeed, in this state of the foot, the shoe becomes of the greatest necessity; for it must be admitted that the horse cannot now do even tolerably well without it.

If the foot has been previously well formed, or in such way, and with such properties as it is found with in the middle order or medium stature of horses, or especially as in the blood horses, it is impossible that inconvenience should not be felt in some way or other in his manner of going, at this degree of the contraction. Some leave the stable tolerably well, and do not at first appear incommoded: but, ere they have travelled far, a want of firmness and proper step-

ping is almost sure to be perceived by the rider: some, on the contrary, go very crippled at setting off, and mend as they get warm. Their manner of expressing what they suffer will be very various, according to the constitution of the animal, the nature of the foot, the more gradual the contraction of the contraction, and the manner in which the shoes on the feet are fitted and nailed. We have not been able to give with any precision the different gradations of these affections, or the different modes of going in these states of the horse's feet, and it is usual to take as little notice of these defects as possible, for obvious reasons; such as the fear of lessening the value of the animal, and the dread of the reproach of timidity or want of jockeyship. It is therefore common to see the matter glossed over and treated as of little consequence, or rather as a subject of jest and ridicule than deserving commiseration: it is occasionally considered as somehow a defect of nature, or corresponding to the decrepitude of age.

With men who are employed to drive the stage-coaches, the defects above noticed are made subjects of much humour and merriment, and they invent phrases to disguise the too obvious sufferings of these animals, in order to prevent what they may consider impertinent inquiries. The more jocular these phrases are, and the less meaning they convey, they are the more suited to the purpose; for though such men have but blind views, if any, of the manner in which these imperfections are produced, yet they cannot but perceive them, and there is a pride in not admitting their existence. Thus, if any inquiry is made, we are commonly told that the horse is "only a little groggy," insinuating thereby that he is tipsy, or that he goes as a man does who has taken too much liquor, though the poor animal could have borrowed his grog only from the beams of the glowing countenance of his ruddy friend on the coach-box. At other times, in answer to this inquiry, we learn that he is "chest-foundered"; for it is notorious that

that the pains of the feet of many horses occasion a strong retraction or hollowness of the skin and muscles situated at the front of the breast, as a man with a belly-ache habitually reaches, till the parts habitually take this form. "A stick in the back," "a screw loose," are rather figurative modes of description. — "as lame as a tree" is also a favourite expression. The jockeys and trees that never move afford a very accurate representation of the going of horses. "Queer understandings," "a pain in the shoulders," "a nodding cove," "a cat on hot irons," or "a hop merchant," are choice and lucid terms, ever ready for the satisfaction of impertinent inquirers into the affairs of horses, and serve to guard this mysterious department of knowledge from the danger of exposure. Such answers are too often received as proofs of deep skill in horse-flesh; for as they convey nothing that any one can comprehend, so they throw an impenetrable veil over these defects, and even excite a dread of interference with the intricate affairs of horses.

We have already stated that phrases are wanting to represent the various exhibitions of suffering; but we may observe, as to the fact, that the first effect of tenderness or of pain that is not very acute will be, that the animal will not permit the limb to take the full extent of its motion, and, restraining the action of the shoulder, will occasion a contracted step. This being the first external indication of the pain, it is often by superficial observers referred to the shoulder itself. The foot, for the same reason, will not in general be raised so high above the ground, in order that the impulse on its descent may become less; thus inducing tripping. The toe, by the construction of the foot, being the most fixed part of it, is consequently the least injured by the operation of the shoe; the horse accordingly, when travelling, endeavours to make it serve all the purposes of the foot; and hence the digging, hobbling, and often blundering manner of going. There is frequently, also, in early stages of the mischief, a degree of faintness, and

and a distressing sense to the rider of sinking under the weight. Such are the appearances and effects of these affections, and from considering them a more full knowledge of their nature will be obtained.

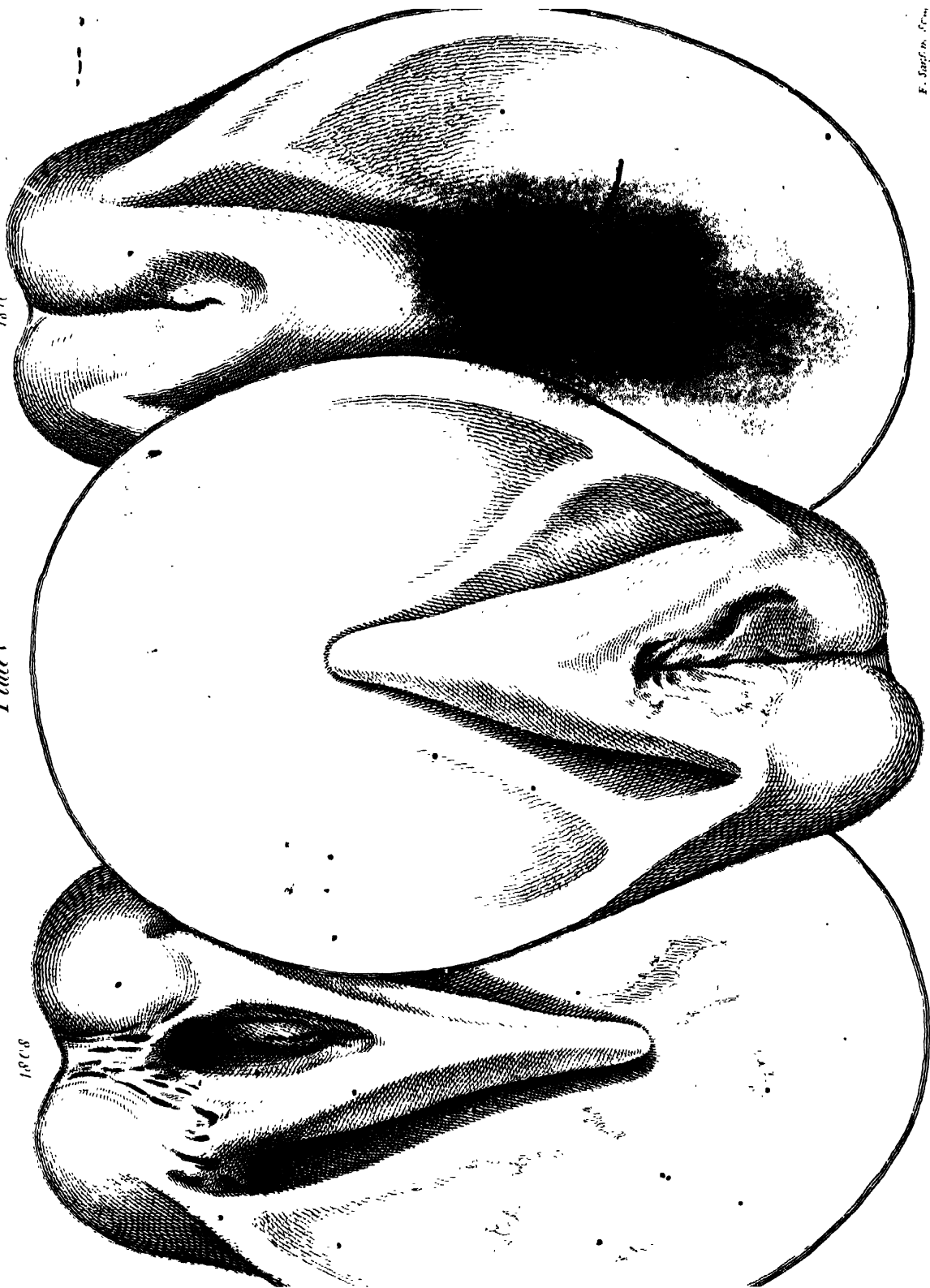
Our roads are crowded with what may be naturally looked for in the consequences of these affections in the mode of going of our horses, almost every man and woman on horseback are seen quarrelling with their horses, constantly abusing them for their negligence and want of care, and not apprehend it to be, in their going : jaggling their mouths with the bit, or using the whip or the spur, to keep them alive and prevent their falling ; sometimes cutting them on one shoulder and sometimes on the other—for it is a matter that has not yet been decided, whether in these cases it is better to punish the offending limb or that which is opposite. The nodding of horses alluded to in one of the above phrases is a habit frequently seen, and, we have thought, more especially with the hackney coach-horses ; it perhaps affords a momentary relief to the fore feet, from partially taking off the weight of the head at the time of making this movement.

And as horses when brought into this crippled condition are no longer of much value, so they usually fall soon after into the hands of unprincipled men, who make them serviceable by severity of treatment ; and with such insolence are their measures carried on, that reasonable men scarcely dare to interfere, as the laws do not protect them ; and there is no restraint to cruelty on account of their loss, that they are made to endure the most intolerable hardships and abuse, as though their inability were of their own making, and they merited to be ill-treated ; by excess of labour and suffering they are early rendered unserviceable, and are obliged to be slaughtered ; for continual pain, which in various respects is their portion, will, as in all other animals, wear out and exhaust the bodily powers, and prematurely bring on the decrepitude of old age, and the necessity of their being destroyed ; and in this wretched state, often are they seen
severely

Plate V

1870

1870



severely punished and abused, when they have done their utmost labour, because they cannot do more ;” and yet we are to maintain the most trifling rights of men, in respect to the property of the ox, and to give protection to these innocent animals, when they are ill-treated, and even when the protection is however gross and unmerited. It seems, indeed, a monstrosity of justice, that after the use of his feet has been taken from him he should be abused because he can't go ; and especially when we recollect his willingness on all occasions to exert his strength and powers for us, by the

* Lord Erskine has, however, greatly to his own and the honour of his profession, (for one should have expected it more reasonably from either of the other learned professions,) stepped forward in their behalf, and endeavoured to obtain for them the protection of the law. We hope his generous intrepidity and hatred of oppression of every kind will not let him desist from renewing the attempt ; though we could wish a more generally diffused information, inducing a spirit of humanity towards them, should rather take place to effect their relief, than the terrors of offending against the law. Claims so natural and strong for protection surely cannot long be resisted. Heathen Rome had more humanity ; for in the early periods of the Commonwealth it was death to any one to ill treat the oxen, so meritorious were they deemed, and deserving kind treatment for their services and uses, and as having the particular protection of the gods. The horses of their public games which acquitted themselves well were kept at the public expense till they died of old age.

The sacred writings were not meant to convey a code of laws respecting the usage of animals ; but from a single precept we may judge of what complexion this would have been if made, when it is said, “Thou shalt not muzzle the ox that treadeth out the corn,” intimating figuratively, that not merely they should not receive abuse and cruelty, but that the most liberal and generous treatment should be extended to them.

almost instantaneously, even to the extinction of life itself ;
 does to the benefits of every
 the interests and pleasures
 the poor,—not deserving such
 destroyed with circumstances
 induced upon error, and which
 us to see in its true enormity : and
 away, in which these errors have
 ignorant and thoughtless acquiescence with
 them ; and formerly with more effrontery and harsh proceeding in those
 inflicting them than at present. From these causes horses are made
 scarcer and dearer consequently than they otherwise would be ; and a
 greater number are obliged to be raised for the public supply, and tracts
 of land must be kept untilld for their support. Men scarcely begin to
 get used to their horses often, than they are obliged to abandon them.
 Post-masters and jobbers of horses are struck with astonishment at their
 prodigious and unaccountable losses, which can, for a great part, be
 traced to these causes. It is often the case, however, that from a
 timid or avaritious spirit they are under-horsed, or without a sufficient
 number for their work, in order to save the expenses of purchase and
 of keep, which brings on those they have more labour than is con-
 sistent with health : they suffer losses in consequence, which further
 intimidates them ; and they progressively get into worse disorder,
 and sink at last into the most destructive violence and abuse of them,
 and then we hear complaints made of great losses and ill luck, &c.

* How much later than the fourth century we know not : but we shall presently ex-
 hibit undeniable proof that it was not till after this æra that shoeing with nails was had
 recourse to ; although it is generally imagined by the public that shoeing and the use
 of the horse were necessarily nearly or quite coeval.

As

As the nature of this derangement does not require further illustration, notice is that of the year 1810, the foot is further deteriorated, and robbed of the integuments, the elastic stuffing, the cartilages, and the frog, have succeeded the iron; and now the bone of the foot is in its rigid embrace.

One remarkable circumstance is worthy of attention respecting the frog in this experiment, which is, that the thrush no longer exists; the frog-stay has grown up and nearly obliterated it, perhaps from the foot being exposed to a more congenial soil, or from a less feverish and more healthy state of the body; which thrush ought, on the contrary, to have been worse instead of better, if contraction of the heels had alone been the cause of it, for the foot is now more contracted and diminished than in the preceding year; indeed, it is to be remarked, that young horses of one and two years, where there is neither contraction nor cause for contraction, yet are subject, and very frequently, to thrushes.

The uniformity and rapidity of the deterioration of the foot will, it is obvious, much depend on the discretion of the smiths in paring out the feet, and in fitting out and forming and also nailing the shoe; and differences in this respect shall occasion one foot often to suffer before the other.

It has also appeared to us that the operation of the effects of the iron is not in one direction only, or laterally, but that the sole or under surface of the edges of the coffin-bone is also affected by the long continued upward pressure of the shoe, and from the rigid state to which the

the horny sole is hard, and the bone of the heels we have thought changes were what they belong to the natural bone. In some cases the bone at the heels or inflexion grows, and the bone of these parts may also be affected by the natural motion of the foot. In some sort of feet as high posteriorly, the contrary, where there is a deficiency of the elements of the foot, (if we may be so bold as to say) a general failure of the heels, and they grow continually lower from the operation of the iron.

Some feet remain perfectly smooth to the last; others become wrinkled with shoeing, especially at the heels, which we have thought in some cases arose from undue pressure of the shoe at the heels, which may be made by the fitting of the shoe greater than at the toe, depending on the level given to it: also from the heels previously weakened by cutting and with a deficiency of the internal parts are by drying disposed to these deformities. We also in some feet see the horn of the heels turn under, primarily from an ill figure in the conformation of the hoof advancing too much forward, which the pressure of the shoe increases; and with such feet corns, or bruises, and tenderness are very frequent, for the incumbent weight which falls more perpendicularly over these parts has then too much power over them. The front incurvation of the hoof also is a frequent source of wrinkled heels.

A very sudden slope inwards given to the shoe at the heels shall occasion, by the partial operation of the pressure on the outside edge only, a tendency to convergence in the upper parts of the foot; whilst the weight receiving no support in the middle of the foot or base of the frog, it shall be forced downward and create a divergence in these parts, opening the frog-stay, and causing the heels to sunder; and we have seen a thrush that appeared to have its origin from this cause. The frog-stay in its structure appears made up of concentric cones of horn,

Clark's Report. p. 18. 10

Plat. VII

(A) The Fry says, b. The Fry says, c. The Fry says, d. The Fry says, e. The Fry says, f. The Fry says, g. The Fry says, h. The Fry says, i. The Fry says, j. The Fry says, k. The Fry says, l. The Fry says, m. The Fry says, n. The Fry says, o. The Fry says, p. The Fry says, q. The Fry says, r. The Fry says, s. The Fry says, t. The Fry says, u. The Fry says, v. The Fry says, w. The Fry says, x. The Fry says, y. The Fry says, z.

Sydney Edwards;

The Contracted Foot is a... the angles closed
The Frog Stay returned condition

E. Sanyal, Jun.'s

horn, which we have more than once observed to come away in pieces of that figure, till it was so much diminished, that the remaining horn was insufficient to keep these parts together, which has ensued.

On making sections of feet in the same manner, we have thought the cartilages were denser than the horn, and we have already stated that in many instances they were not coverable.

It is said that the elastic sutures or processes connecting the foot to the hoof are sometimes found ossified : this circumstance we do not recollect to have seen, but the want of their motion is likely to induce such a circumstance. It also seems to decide what we have long doubted, whether these parts are more of the nature of cartilage or horn ; their nature, if this be true, seems proved, as cartilages frequently, but horn never can become bone.

In *pom-footed* horses, where the coffin-bone has fallen from its situation in the hoof, these attaching sutures elongate laterally, and go with the bone in a remarkable manner, and fill up the space between it and the hoof, forming a solid substance of a *corneo-cartilaginous* nature ; sometimes occupying a space of more than an inch and half in extent. It has also been matter of considerable surprise to us, to observe how well horses labouring under a slight derangement of this sort can go, provided the sole is properly defended.

The elastic sutures of the hoof itself, it may be remarked, appear to be different from those proceeding from the foot ; the former partaking more of the nature of horn, whilst those of the foot have an appearance and texture more like cartilage ; and tried by burning, we have thought they yield a smell not so strongly of the nature of horn.

That I might notice more accurately the first visible effects of the shoe on the foot, I this year, 1811, ordered my own bay mare to be shod ; she was nearly five years old, and never had had a shoe on. In this experiment I was surprised to find that the upper parts of the foot first

felt its effects ; the upper part of the hoof and coronet became heated by it after about three or four applications, and the coronary frog-band became more drawn, the shoe backing away and leaving the hoof sooner than formerly, so that it was able to embrace and bind the hoof more closely. After the shoe was removed, the shoe could be discerned in a depressed ring of horn, which was grown as the hoof grew, and was visibly different to the horn preceding and following it.

Here we quit the further consideration of this experiment, in observing that the ultimate effects of the iron on the feet, especially in such as the shoes are particularly inimical to, are never seen, since they are no sooner, from loss of parts or disfiguration of the feet, rendered unserviceable, or from over-exertion, or pain, than they are slaughtered, their supply being very plentiful ; that we know not to what condition the foot would at last be reduced.

Having now exhibited the inimitable beauty and simplicity of design in the structure of the foot of the horse, and its provisions for destroying a too sudden resistance to the weight of the animal on meeting the ground, and disclosed, by actual experiment, proofs of the injurious nature of the shoe in respect to this property ; and though much labour and care have attended these elucidations, yet we apprehend our readers will expect from us the consideration of further topics relating to these matters, and about which they may be even more solicitous than about the above illustrations, which were, however, previously necessary properly to understand the nature of these evils. The reader would perhaps be desirous of asking, What can be done with feet already injured, as to their restoration ? and whether we must be obliged to go on with these errors, from the impossibility of removing them ? or whether we may partially remove them with those horses whose very utmost work is not required ? for it will be readily admitted by us, that to obtain the full measure of work which the

the horse is capable of giving on the road, some artificial defence is necessary ; or whether, by refraining from shoeing, except with tips, the mischief may be greatly prevented, we must rest content with that? or if we may look for a remedy of the evil in all cases by shoes on a principle which has been sufficient for us to consider as a remedy, we do we consider ourselves pledged, in consequence of these discoveries of the defects of the present system, to find a remedy; since it has been much to point out a gross evil, that was scarcely before suspected, and certainly not seen in its true light. We believe, however, that preventative measures may be resorted to, to a great extent, and remove a considerable share of the evil, without much inconvenience ; and of the remedial means in part, or perhaps wholly, we can, after much reflection, hold forth promising expectations, and which we believe will not be disappointed.

Before we consider the restorative measures generally resorted to with injured feet, we shall briefly describe the kinds of shoes at present in use. We had drawn up a more particular description of their make and mode of application, &c.—for, strange to tell, of so many books as have been written on this general and interesting branch of inquiry, none have given us the actual process of making, applying, and fixing the horse's shoe to the foot :—but we found this account too bulky for insertion in the remaining half of this volume, and have therefore (except the following small extract) laid it aside for insertion in a future edition, where no stipulation of this sort may exist.

The ring or imperfect circle, of iron, we term the shoe of the horse, will admit of an almost endless variety of fashions in its make, as to its extent in length, its width or narrowness, its lightness or thickness, the disposal of the strength of the iron, &c. Its surfaces again admit an infinity almost of forms ; and these differences have been seriously dignified

dignified with the appellation of "principles of shoeing," though the same principle pervades all, for, however varied, it is still the same iron ring, by which the nails driven through the lower parts of the hoof restrain its movements. Changes may vary without end, and the principle is the same at all times, in doing it, this only essential condition, that the shoe do not or approach too near the sole. This apprehension of a difference of principle in these changes has tended strangely to confuse and bewilder the subject.

A shoe or thin ring of iron just wide enough to defend the wall and carry the perforations for the nails, is termed the *Racing or Plate Shoe*; with the hind feet it is made to extend but a little beyond the middle of the hoof; this kind of shoe is also usually deeply fullered*.

A shoe or flattened ring, possessing greater width than the former, made thicker and heavier also, and a little concave or bevelled on its upper surface, is the *Shoe in ordinary Use* throughout this kingdom for horses in general, being a form the most easily made.

A shoe wider still than the last, or broader in the web†, perfectly flat below, or next the ground, and above flat also, where the hoof rests upon it, but with the rest of the breadth or web concaved, is the shoe recommended by many of the best writers on this subject; as Mr. Moorcroft, Mr. James Clark of Edinburgh, Osmer, Taplin, &c., and anciently by Blundville. The difficulty of making it appears to more than compensate its advantages, and occasions it to be not much used.

* Perhaps this term is derived from a species of stamp used in the clothing business. The fullering is an impressed line or channel made round the circumference or rim of the fore shoes especially, to give greater lightness to the shoe, and for protecting the heads of the nails.

† A term derived originally perhaps from the weaving business; the addition of successive threads in the loom will produce, by their aggregation, a web, weft, or width of stuff: hence all within the circuit of the resting-place of the hoof is termed the web of the shoe.

A shoe concave below, or ~~not~~ in imitation of the actual hoof, and flat on its ~~top~~ the shoe proposed by St. Bel, the first professor ~~of~~ in his *Treatise on Shocing*, and was constant ~~in~~ college.

The *French shoes* are after ~~being~~ being usually made without fulling ~~the~~ received, in part at least, into a large square sink, with which the perforation of the shoe is stampt: these holes admit larger nails than ours, and are square headed, not oblong. The holes pass round the front of the shoe, and both there and in the quarters stand more within the outer circumference or rim of the shoe than in ours, which must make the shoe, when on, project more beyond the bounds of the hoof, and make it necessary for the smith to pitch or direct his nail in driving more outwardly, which will take them out sooner and not convey them so high up the hoof as in ours, and which is so much aimed at by our smiths as a perfection.—The perforations do not approach the heels of the shoe so nearly as in ours, and the last hole is considerably less than any of the others. The web of these shoes is *convexo-concave*, or above concave, with a correspondent convexity below, as in a bowl, of which the seating or resting-place of the hoof is part, as in our ordinary shoes. The iron is thickest at the toe, and thinned away very gradually to the heels, where it is about half the thickness of the toe.

Such are the kind of shoes we have observed in use when travelling on the Continent: and this description is more particularly made from the shoes actually taken off the Marquis Cornwallis's horses on his return from Paris, after an unsuccessful attempt at negotiating a peace about twelve years ago.

There are many other varieties or modes of forming them, for they are indeed endless, and some which have been tried in actual practice, but have soon given way again to the *ordinary shoe*, which,

with greater facility of motion, we believe, combines as many advantages as any of the shoes. The convexity of its upper surface so much complained of, produces not such consequence as has been supposed; it is not so much in excess than is usual; for the shoe is not so fixed to the shoe that it prevents the descent of the hoof surface, so as to compress the hoof. It has been generally imagined: for unless the outer shell of the hoof is broken or extend to permit it, this descent cannot take place at the quarters; and the heels, though they have some play on such a surface, yet it is not considerably felt, on account of the fixed state in which the quarters are held.

The *low- or thin-heeled shoe*, and its objects, &c., has already been noticed in the beginning of this Second Part.

The *bar shoe* is a complete circle of iron used with tender feet, or where the hoof is much broken; it gives ease by the defence it affords to the more suffering parts, and from the extensive surface it presents to the ground.

The actual practice of making and applying these shoes and some others, and the arguments used by the different proposers of them, with some remarks on the effect of the wide and narrow web to the foot, will, with other matter respecting them, be introduced on some future occasion, as before stated.

We now proceed to the consideration of feet that have been injured by shoeing, with a view to state some unexpected facts and truths of the consequences which attend the usual attempts at removing the evil by taking away the shoes and turning out: and numerous and burthensome were the experiments we made on this head, before our natural prejudices were overcome, and the truth became unfolded, that this communication, if not the most important, is at least the most costly of any part of our studies with these animals.

An ESSAY on the Feet of Horses, and the Art of Shoeing; with Experiments exhibiting the Effects of the several sorts of Shoes'and turning to Grass, the Structure of the Coffin-bone, and

THE high value of the horse will be generally and justly felt; but if he is disabled, so as to be unable to do work for any length of time, it is often attended with more serious inconvenience and detriment than death itself; that one should apprehend any accession of knowledge, however small, respecting him, if it has a tendency to preserve him from being injured, cannot but be well received, and acceptable to the public. For it may now be seen how little these affairs of horses have been really understood, or were likely to be so, by those who were supposed by the public "to know them" best; and how impenetrable a bar to their being fully understood did the obscure affections of the feet present, and what an incitement to ill usage, and cloak and protection these intricacies afforded to the machinations and knavery of the ignorant.

Our practice is very often affording fresh proofs of the extensive injury done to horses from the want of knowledge of the facts we are about to disclose, which we hope may induce greater caution with people in having recourse to this seemingly natural and obvious remedy for the evils of contraction.

Hardly any employed in these arts could fail to observe that very many horses' feet became contracted by shoeing; but as it did not occur to all alike, it made them rather refer the evil to some defect of the feet than of the shoe, though it might have been seen that the finest and most perfect models of the feet were the greatest sufferers. And that when this contraction was very strongly marked, and especially

cially if attended with inflammation or lameness, the practice was, and continues so, to apply the fire immediately to measures for expanding the feet, and to consider the parts to be the chief sufferers principally. Cutting the horn of the hoof, putting on tight shoes : or screwing them on, are the means resorted to for this purpose ; and many, who have asserted confidently the great advantage of these measures : and in some instances this might be true, but in a general view we believe a more close attention to facts would have led them to think differently—for some are so blinded by preconceived reasoning and notions, that facts and results, if they turn out the very opposite to what they expect, do not appear in the least to open their eyes ; for, say they, if horses' feet suffer from contracted heels, and these are opened, *it must be* attended with advantage : the reasoning appears strong ; it is, however, as we shall see, delusive in too many cases*.

We cannot convey what we have to remark on this subject in any way more usefully than by a faithful narrative of some of the experiments, and their actual results, as they occurred to us, and which, though they embarrassed us very much at first, ultimately served to open our eyes to the truth ; but so strong did the reasons seem for these measures, that it was not till after much research and repeated failure that the cause of the want of success appeared ; now it appears only matter of surprise that so obvious a reason for this could have been so long concealed. It serves to show how necessary it is for those who would make new discoveries, to hold their minds open to receive impressions which may not comport with their present reasoning, nor lean too

* Mr. Moorcroft, in his little treatise, has also noticed the fact. He says, that although these horses, after being blistered on the coronets, and fomented daily, &c., and turned out, come up from grass with their feet considerably expanded, they do not appear thereby to have their lameness removed.

THE CORONARY FROG-BAND of the HORSE-HOOF.

Plate 8.



a, b, c. The coronary-frog-band raised from the Hoof at b, with a plate of black ivory inserted beneath it.

d, the left Bulbiformity of the frog of the Hoof, showing by an extension of the middle of the frog filling up and pressing against the Hoof at its upper part, at the outside becoming narrower than the frog-band.

e, The inner side of the right bulb of the frog exhibiting a fissure in young subjects between the tougher Horn below, exposed to the ground and the tenderer Horn above.

The frog of the frog-band, k.

F. Jensen Jan. '30.

much upon it, as it may close the eyes to the obvious and simple truths ; it is from this prejudice of reason that errors when made are often lost again, because the reasons which support them cannot be reconciled, and they go rejected. The apparent good reasoning shall be overruled, and their ill consequences be overlooked, being stifled in the apparent truth which supports them ; till at length more accurate research shall point out their evil tendency, and then will appear also the fallacy of the reasons which upheld them ; or, which is more common, that the error arises from too general and sweeping conclusions, drawn from apparently simple grounds or premises ; but where some lurking condition that is overlooked is necessary in the account, and is sufficient to falsify all the conclusions and reasonings, however clear and strong they may appear.

It would be perfectly natural and easy to conclude, that when the shoe was removed from the foot of the horse, and his foot was left again in its natural state, that it should recover from the effects of its embrace, as naturally as we at night remove shoes from our feet that have been too tight, and find in it a ready and effectual remedy for our uneasiness : and with horses it would be as confidently imagined, that if their shoes were removed, the same good effects should as naturally ensue :—hence the difficulty of apprehending a different result.

The fallacy of the reasoning is now obvious enough ; the horse's foot in nothing resembles the human, and the shoe is a bar of iron that has no similitude to our leather shoes ; and the perpetuity of its application has no correspondence to the removal of ours every night. That similarity of names merely has served to beguile our reasoning in this respect : a relation of the experiments, in which we have endeavoured as much as possible to divest ourselves of any bias, will better serve to unfold the real effects than a generalizing narrative of the results.

In the month of August Mr. M—g—l applied to me for assistance respecting a handsome bay hunting gelding, well bred, and about half high. A complaint was made of the foot, blundering with it frequently going down. There appeared no swelling of the limb that would indicate a fracture, or any other cause for it, which led me to apprehend that the shoe or a nail too close might be the cause of the evil. I ordered the shoes to be removed, the foot pared out, and the nail-holes to be examined, and a new nailing and shoe to be used ; the foot to be immersed in cold water, and to be afterwards stopped with emollient stoppings. These were applied for some days, but with little relief ; complaint was still made of his manner of going, and an anxious desire expressed of parting with him, to avoid expenses, which perhaps before had been found but too often of little avail. He proposed the purchase of him to me, with all faults ; and I purchased him for 24*l*. Apprehending, with tolerable confidence, that it had been or was the effect only of the embrace of the nails of the shoes that had caused this defect, and that by a few weeks turning out to grass he would be restored, and become a valuable horse, I had the shoes removed, and turned him to grass in a field near Peckham ; having first pared the hoof thinner, that it might make the less resistance to the expansion of the heels. On having him up from grass, about six weeks after, I could not but be struck with the singular alteration of figure that had taken place with both his fore feet, but more especially the near one, which was the tender one. The toe, to use a phrase of the smiths, had “run out,” and appeared longer ; the quarters or sides of the foot had become flattened and almost bent inwards ; the heels had somewhat opened, and were projected more backwards, or at least appeared so, that his foot had more the appearance of a square than a round ; his chest was retracted

tracted and hollow,—a frequent but not constant attendant of pains in the feet ; he stepped short and ~~appeared~~ near the ground, and on his toes as much as he could ~~appeared~~ bent in in front, or was incurvated about ~~the neck~~ bright, and assumed somewhat of a twisted figure.

Having no knowledge or suspicion of the cause of the lameness, and the nails, I was wholly at a loss to account for it. I apprehended, however, that, whatever it was, a complete expansion of the foot would perhaps remove it, I resolved to send him to grass again, by which I hoped soon to obtain the benefit I apprehended must ensue. After being at grass several weeks longer, I had him brought up again ; and, having occasion for his services, determined to use him, and not to apply the shoes, that the expansion, from the exercise and the additional weight of the rider, might be the more effectually accomplished : and this I continued to do for several weeks, using him only at times, as his hoofs would bear it ; notwithstanding, he went painfully crippling and tender ; and sometimes at grass, and sometimes in use, this I continued in the practice of for several months ; for though it was during this period my suspicions began to be awake to the probable influence of the nails, and the former experiment to detect it was made, yet I saw no reason why feet should not be restored again if the cause were removed. Sometimes he would put forth his feet with considerable boldness, and go tolerably fair ; but for the most part his pace was miserably crippling and tender, and saving his feet. This difference I have since believed was the mere effect of the spirits he happened to be in to endure pain, or his insensibility to it, or from his feeding, or the state of the atmosphere : he tripped, however, and hobbled, both without and with shoes, that riding became highly dangerous. Finding these measures not likely to restore him, and that longer perseverance promised no advantages, and tired of the ill success and expenses of the experiment, which had

now been continued ~~more than~~ a twelvemonth, I broke him in for harness, and resolutely ~~continued~~ but with bad success also for several months more.

~~He was then sent to Tattersall's, to be sold for what-~~
~~more than one half of what I had~~
~~conclusions from this experiment, a~~
~~have been some other evil than the~~
~~for his not being relieved. Still~~
~~confident in the~~ the means, a few months before I sold this horse, I bought a brown hunter of a Mr. F——r, whose feet were tender before, and from corns, as he had been told; but on examining his feet, and finding there was nothing of the kind, I apprehended contraction was the sole cause here also, and the removal of the shoes, and turning out would set his feet to rights again. I purchased him for about the same sum, and sent him to the same grass field, to be company for the former. The bars were pared away from the frog, the heels, as we are used to call it, were *well opened*, the quarters rasped thin, the hoof smeared with emollient unguents, &c. that there might be as little resistance as possible to its expansion; and nothing that we could devise, with a prospect of advantage, was omitted. Briefly, he became very near in all respects the same as the former; his hoof fell in at the quarters, his chest became retracted, and his action the same as the former; and I sent them both on the same day to Tattersall's for sale, with a similar result.

The ill success of these experiments made me more cautious, but did not at all open my eyes to the cause of their failure. Hoping still to obtain a valuable and sound horse by expanding their feet, I purchased, late in the autumn of the same year, a favourite brown gelding, suffering evidently from contraction, of a Mr. S——y, an eminent surgeon in London; and resolved to try stronger expedients with him, and to give the utmost opportunity for the desired expansion of the foot.

I was very desirous of restoring him to soundness, on account of his good temper and inestimable qualities. We all call him *Tippoo*, the name we received with him. He was brought to me by Shum, a brewer ; and, as I learnt afterwards, had been brought to him by a Chinese, for his use : he was sold for tripping, for the purpose of being used as a tender, going with short steps and in a jerking manner. He appeared evidently to proceed from the north (as I have observed, as I then apprehended,) and the following medicines were used for restoring him. He was seven years old, consequently had been shod about four years or four years and a half.

Though many expedients occurred to me for forcing the heels open, mechanically, as by screws, springs, wedges, or, as St. Bel used to propose, by bevilling the heels of the shoe outwardly ; yet from what I had seen of the want of success attending these measures, and from considering also that if the heels were forced open, unless there was something within that could support them in this state, it could be of no real or permanent utility ; and from reflecting that living sensitive parts cannot bear much restraint or violent mechanical distension, or endure very sudden alterations of form, unless accompanied or operated by the slow process of growth, after the evil causing it had been removed ; and if the distension was oppressive he could not relieve himself, and it might have injurious effects ; so it appeared to me, that after the shoe was removed from the foot, the alteration would be sufficiently rapid to be useful, if it was exposed without it to the weight of the animal, and the hoof softened by removing with the rasp the outer shell, and moistened by the grass and dews ; and to give it the better chance of expansion, a deep longitudinal channel was cut with a drawing knife down the front of the hoof, that it might have no resistance to the expansion of the sides. Further to assist these measures of dilating the heels, they were drawn very thin, and the bars as much as possible cleared from the sides of the frog. .

Anxious for his restoration, for the reasons I have stated, I deter-

mined to spare no pains in the accomplishment of it, and turned him out to grass in the fields at Paddington; and conceiving my former experiments had not been attended with sufficient expansion, I determined to try a different method as far as possible; and attended him all the winter, and kept him continually kept thin the new growing season. I used a compound of wax and tar, in order to prevent the effects of the wet. The frog frequently exfoliated, and in attending him that the nature of these exfoliations became known to me, as explained in the former part of this work: this part grew much larger, and the clefts and chops, from cutting and exposure to dry air, slowly became closed and grown out; a thrush also, in the same manner, became dried up, and ceased to discharge, and was without irritation, but the two surfaces or halves did never perfectly unite, from want of powers in the frog-stay. At Paddington, Peckham, and in various places he was kept during two whole years, and in the winter at straw-yard at Barnet, &c.; occasionally he was rode and drove without shoes, to observe the progress and effects of the remedy, and that the unequal pressure afforded by the road might further assist: but after all, though his feet became widened, I could not discover much amendment in his going, but thought him on the whole the worse for what had been done. I still, however, hoped the advantages of it would one day appear, on the expansion being completed, and kept him beyond the period I have stated; but at last grew so tired of the expenses and ill success that attended it, that it was with some difficulty I sold him. The gentleman who purchased him complaining of his dangerous mode of going, I took him again, and rather than have this worthy creature pass through *the using up service*, I had him destroyed, though for coach work he might have brought me from ten to twelve pounds perhaps. I did not, however, yet see why the foot should not recover.

Beginning, however, to apprehend that the want of success was occasioned

occasioned by the feet being under the weight, I next bought a young bay Welch mare, that was shod not more than two or three times; but I was to believe from her age, which was three years and some months, the practices of the country from whence she came, that she was made, even at a year old, to do a deal of work in conveying iron, coals, and wood, to the ruins them before they are brought to market, as she had been shod nearly or quite two years. I however entered with tolerable confidence on the experiment, on account of her age, and hoped to get a sound mare by it. I cut away and thinned out the horn of the heels, and rasped the hoofs till the blood almost appeared, pared the sole thin, and turned her to grass at Peckham; indeed, that she might have no risk in travelling, this process was performed in the very field she ran in, and after fairly trying the experiment nine or ten months, I still found the same results as in the former; for she went rather worse than better, though at first advantages appeared to attend these proceedings; and after some time her sole appeared more sunk or prominent before the point of the frog than it ought to be, and the hoof rather incurvated in front, her step became very contracted and tender; and after nearly two years keeping, exposed to all the measures I could devise for expanding them, I sold her at a considerable loss, more a cripple than I bought her.

These repeated disappointments damped my expectation of success; and the expenses of them were severely felt, for in the removal of the cause the remedy appear'd so natural and certain that any other than a successful result could hardly be expected: this uniform failure, however, led me more attentively to consider if some other change than mere contraction had happened to the foot during this collapse of the hoof, and which finally disclosed the true cause of our want of success. Before, however, we enter on this explanation, we shall briefly

briefly relate the results of another experiment we made on this subject, about this horse, as it contains some further remarks and particulars of the kind in the preceding experiments, and of the manner of seeking the truth by experiment in the various instances that occur, however contrary to the prevalent views or wishes. We were informed by the terms on which we were offered the subject of experiment, a Hackney chesnut gelding, about six years old, with rather flat feet, which kind we have before remarked are not so soon injured by the influence of the iron. He had been from some cause or other so offended by the shoeing smiths that he would not let one of this fraternity approach him, much less suffer them to touch his legs. When I bought him he was not recovered from marks of violence which he had got by being confined in a trevis; and now that mode of confinement was impracticable, for he would not suffer himself to be blinded, or approached with a twitch or any of the other measures used in such cases, but would exhibit the most determined resolution to use all the means he possessed of offensive warfare; if a smith entered the stable, or he could smell them at a distance, he gave warning by furiously blowing and snorting. This horse was one day led into a shoeing shed, by one not acquainted with his scruples in this respect, and getting loose, he with heels and teeth soon cleared the premises of every individual, who were happy to escape his rage. Being useless almost on this account to his owner, I purchased him for about half his value, and made him the subject of a very troublesome series of experiments on a new means of shoeing; for it was become very obvious that if the expansion of the feet was effected, the application of the original cause would soon reduce them to the same state again. I so far ingratiated myself with him as to remove his shoes, though not without great caution, and some threatenings on his part; and he

he was kept for nearly two weeks in the stable, during these trials ; and if he was rode in shoes, or with those I applied without nails.

(for no particular measures were taken) grew larger, corroborating the observations of the chesnut mare already related, showing that it was a sufficient cause for contraction ; and that without shoes than any I had before tried, the feet were and tender, and subject to heats after exercise, in the feet and coronets : the expansion having been more slowly effected than in the foregoing experiments, was, I believe, favourable ; and in the course of making these experiments a circumstance occurred that gave me much satisfaction ; for I found if the horn of the bars or inflexures of the hoof was pared away from the sides of the frog, it greatly contributed to the pleasantness of his going. We should state that the heels of this horse at length became tender, and with bruises or corns, as they are called, arising perhaps, in part, from the flatness of his feet and lowness of those parts naturally, but also, from the heels, by shoeing, having become stiff, and having suffered a loss of part of their elastic provisions ; for with unshod feet, in the natural state, which we since have had several opportunities of trying, these things did not occur : we should also mention, that after awhile the frog split, with a dry cleft ; and this at length became a thrush, and discharged ; a circumstance which more surprised me, as pressure on this part, according to the general doctrine on this subject, should have rather suppressed than created a thrush. The same also occurred to two other horses I tried that had been shod, and which I am induced to state, that others, endeavouring to avoid the evils of shoeing, and who may have recourse to the shod foot, as some within my knowledge have done, may be aware of the difficulties they will be liable to. And as the circumstance is alluded to in a former page of this work, we

think it right to
removable.

here, that, whilst employing these
rently made, by our own hands,
n, though they had the appear-
on one or two occasions, for
od with the ordinary shoes, with
himself ; and which led me to sus-
ssure of the nails was an occasional

For after a considerable time, this horse
would permit a man, not dressed as a smith, to fasten on his shoes,
if I was present and encouraged him. But afterwards becoming
tender of the near leg, from an old strain, got probably by being put
in the trevis, and from the other circumstances we have mentioned,
we were induced to send him also to Tattersall's, where he was sold
for about a third of his original cost.

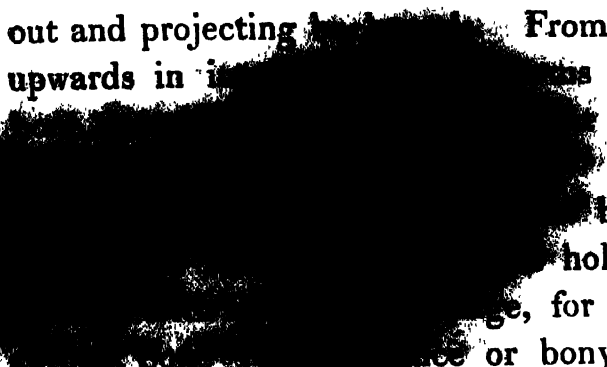





I was now induced to give more attention to the condition of the
coffin-bone in those horses that had been shod, though without much
expectation of its leading to any thing important, and procured several
from the slaughter-house, and macerated them so as to get them
clean ; but from these no conclusions could be drawn, having no bone
in its natural state to compare them with, and, for aught I knew, the
appearance they made might be the natural one. At length, a three-
year-old natural bone was obtained, which gave me proof of its being
changed in its appearance by the shoe ; and some time afterwards,
through my worthy friend Mr. Bloxham, veterinary surgeon, of the
Royal Guards, I obtained one that was four years old, from a horse
that died with his first shoes on. The extraordinary exterior of this bone
was delineated most accurately, from nature by the pencil (to which I
have been before so often indebted) of my much esteemed friend
Mr. Sydenham Edwards, and was carefully copied in the engraving by
Mr. Sansum. We may see in its surface an organization of great
beauty, perhaps more so than is to be found in the bone of any other
animal,

animal, and that has not before been attended to, or perhaps known to exist; and which is gradually ~~attending to~~ with wholly effaced by the effect of the shoe. ~~of the whole animal, we are in~~ addition to the former parts of ~~the~~ leading circumstances of its economy.

The *coffin-bone** of the horse, which ~~is~~ restrained growth, or as nearly so as I have ~~observed~~ it, presents, in its general figure, a cone, more ~~like~~ than does the hoof itself that covers it, a form which gives greater freedom to its descent and movements in the hoof, for the hoof, as we formerly remarked, is a cylinder, very obliquely truncated with a small admixture of the cone in its lower parts; to which we can from further observation add another circumstance, that it is in a slight degree twisted upon its axis; this appears to afford the other remaining circumstance in its structure, viz. the greater uprightness of the inner and the more extensive projecting of the outer quarter: or it may be stated perhaps more correctly, if we say the foot inclines in the hoof to the inside, creating on this side more fulness and perpendicularity, and giving a more sloping direction to the opposite side; the foot itself, thus disposed to the inside heel, is removed farther from the wearing point placed in the diagonal of this heel, the use of which will be obvious in the course of wear in the natural foot. This conical figure of the coffin-bone, we may remark, also disposes it the better to receive the cartilages and elastic parts between it and the upper region of the hoof by the space it allows.

The circumference of this bone describes exteriorly a semicircle, but more dilated on the sides, with the extremities or heels lengthened

* From *cophinus*, a basket, and immediately to us, from the French, *coffin* and *coffre*, a box, in allusion to the hoof inclosing this bone as in a box.

out and projecting  From the base contracting suddenly upwards in  in front an obtuse elevation of  of the extensor tendon of the  behind the elevation just mentioned hollow cavities, made smooth for  for receiving the lower end of the  or bony ridge rises between these impressed surfaces, which enters a corresponding excavation in the lower extremity of the coronet bone, securing it from lateral displacement; the inner cavity of these is ever somewhat larger than the outer; and by this difference the respective foot, whether the off or near, to which the bone belongs can be distinguished.

The surface for articulation is extensive on account of strength, and shallow, which gives greater freedom of motion; while the danger of dislocation, to which, from its situation, it would be particularly exposed, is much diminished, and its security ensured by the strong lateral support of the cartilages and hoof, just within which this articulation is brought. These articulating cavities incline obliquely backwards or towards the heels, and are opposed to the line of bones coming from the fetlock joint; and as the line of pressure towards the ground will pass in a direction perpendicularly through these surfaces, it would fall upon or within the front circumference of the coffin-bone; but for the very sudden slope of these surfaces downwards, and the oblique bearing which the hoof makes on the ground, which directs the pressure more to the quarters, and no inconsiderable share will be received by the shuttle-bone, which pressure will be sent towards the heels; and, in order to this effect, the shuttle-bone is made

* From *corona* or crown; the foot above the hoof being rounded and full from the cartilages which are opposite this bone; hence also, *coronet bone*.

moveable upon an obliquely slanting ~~removal~~ surface on the very posterior edge of this bone, and ~~the~~ completes the cup for articulation, and, by being ~~made~~ and a yielding to the weight is obtained. ~~the~~ articulating surfaces forms together ~~the~~ which it has been usual to refer ~~to~~ idleness in investigating, or real ~~obscurity~~ does not permit discovery of the cause of. The shuttle-bone appears also to be in continual pressure against the lower extremity of the coronet-bone, when the limb is in action, by the operation and support of the back sinew, keeping it forwards upon the above articulating surfaces, and by which office it greatly resembles the sesamoidal bones, situated behind the fetlock joint.

The posterior terminations or heels of the coffin-bone are broadest beneath or at their base, shelving suddenly upwards; towards the extremity they are knotted, and their surface is rough with cells or cavities: becoming thinner upwards, they form a smooth plate or *crista* of bone, round which the cartilage adheres, and it fills also the spaces between the knots; and between this *crista* and the lower part or base of the bone a passage, or large *foramen*, is observable for the admission of the principal trunk of the blood vessels of these parts, and a channel impressed in the surface of the bone is provided for its continuation. These extremities or heels vary very much in different individuals, there being sometimes two distinct passages in the inner heel, and sometimes one only, and occasionally none in either, but merely a notch or groove posteriorly in the bone. As we have already stated, these parts are very short in the young subject, and extend backward with age, and perhaps are not fully formed before the eighth year.

And at the upper part of this bone, on each side, close to the articulating surfaces, an extensive excavation is seen for the insertion and

lodgment of the basis or thickened centre of the cartilages already described in the *Figure* of this work; these excavations are broader and deeper in the *parts*. The cartilage, we may see above crista of the heels, and in the *r parts*; and at its commencement be ascertained in the living sub-*stance*, being wholly *absent* in the hoof.

Next we consider the surface of this bone, where we shall have to notice several new and extraordinary particularities. (See the annexed Plate, fig. 1.) The structure of surface which this bone presents in front, extending also some way on either side, is singularly beautiful, consisting of small ribs or threads of bone longitudinally disposed upon it: these are not placed in exactly parallel lines, but frequently meet one another at very acute angles, forming waving lines, or affording sometimes a reticulated appearance. A first view of these would lead us to apprehend they were designed to carry the processes, having a corresponding arrangement; but this does not appear to be the case, since they are smaller and more numerous, and besides, the processes are found covering the bone much higher than these extend; that they more certainly appear to have the office of supporting the *reticulum*, on which the processes are situated. Above these threads or fibres, the surface of the bone is very much roughened into elevated points and pits, for the firm adherence of the same membrane; and in front chiefly there is a numerous collection often of small pores, connected by threads or filaments of bone for the same purpose. Upon these small fibres, and within their channels, the *reticulum* is firmly retained, evidently more so than it would have been on a plain surface of equal extent, or perhaps than on a surface as considerable as this is rendered that was perfectly smooth.

Small rounded orifices are plentifully seen scattered about its surface, for the admission of blood-vessels.

A notch

A notch is seen in the lower edge of the front of this bone, and above this a prominent *crista* or ridge, covered also with fibrous structure: this is not a *crista* but is more frequently wanting.

On the sides of this bone, where a new and most singular organization takes place, a bone, enlarging considerably, is thrown into plates or scales, forming an oblong lobe of some extent; and these plates are disposed outwards in almost regular lines, being placed over one another like tiles, or the scales of fishes, but not in contact, having spaces between them. The thin exterior edges of these plates present numerous sharp points and angles of bone, and, in their general direction, incline backwards towards the heels; thin partitions of bone lie also between these plates and support them, and towards the lower parts of this lobe cause it to assume more the appearance of cells than plates, and which are continued to the underside of the bone, where the depth and increased size of the cells give it a very rough spongy appearance extending nearly to the heels.

That this remarkable part of the bone may be distinguished from its other parts, as it appears to have tolerably well defined limits, we have called it the *Patiloba*, or the *Scaly Node* of the coffin-bone, by which term it can at pleasure be separately considered, and will give more correctness and facility of communication on these objects, which cannot but benefit our art.

It will be expected that we should say something on the uses of this remarkable and unparalleled structure, being unlike any other bone which we have ever seen, and it may be, at least as to the extent to which it is carried, peculiar to the horse; for it is to be remarked, that as he is the noblest animal of his tribe, and the inferior and meaner members of it having singularly flat-sided hoofs, so they possess a structure of body in conformity with this; for the ass could have no

occasion

occasion for these:
the powers for
impr

of the foot, if to the body was denied
anterior fulness of make in the horse
attitudes, so also the foot is made
structure to contribute to these
sides of the bone, an unusual in-
stained for the adherence of the re-
part of the foot where the hoof, dilating under the
weight, particularly demands yielding combined with strength; and
the bone itself, by being thus formed into thin plates, is also made
in a degree elastic; and the *reticulum*, being sunk in the interstices of
the plates and in the cells, finds a secure lodgment from the danger
of rupture or derangement.

The *base* or under part of this bone is considerably concave and
somewhat polished, with slight asperities or breaks in its surface, for
the adherence of the sensitive sole, which appears to be retained how-
ever in its place more effectually by the deeper cells dispersed on the
sides and heels: small serratures or denticulations of bone surround
the very exterior edge, and hold more firmly in their place the
membranes enveloping this bone

At its posterior part the coffin-bone presents a semilunar figure,
and is on the underside, and beneath the articulating surfaces, pro-
vided with a broad, very deep, angular excavation or cavity; to the
superior part of which the ligament which retains the shuttle-bone to
the joint is affixed; and dilating more extensively downwards, this
cavity next receives the spreading termination of the perforans tendon
or back sinew; the more superficial margin or border of it serves an-
teriorly for the strong adherence of the ligament in which the point of
the internal frog terminates; the remaining edges of the cavity serve
for the more firm attachment of the sensitive sole. The above very
important termination of the back sinew is by its lodgment in this re-
cess, removed from casual injuries and from contusion on the foot meet-
ign

ing the ground ; it is also defended laterally below by the bars or intorsions of the hoof, and by the *straps* of the cartilages, but immediately beneath by the *internal frog**.

In this obscure part it is, in the *are technically termed, from being*

the streets and ways, and which are at

fects often,—that we are induced to speak of them here ; that the tendon being injured by the nail passing through the frog, a deep-seated abscess forms in this part, if the wound does not quickly heal after the injury : from being ill understood and awkward of access, it is usually permitted to go on till it bursts through the heels or rushes up the limb in the course of the tendon, destroying the horse by its ravages

* A very remarkable construction, which does not appear to have been understood, is found with the internal frog, and which we take the opportunity of relating here, as it appears particularly calculated to defend these dangerous parts from suffering under strong pressure or casual irregularities of the ground.

The mass of elastic material which fills the upward or inward cavity or arch of the horny frog is exteriorly covered by a frame-work or capsule, of a white, tough, dense ligament ; and this capsule, in form like the frog, presents three sides, giving the inferior and two lateral surfaces of the frog. Within this ligamentary case or envelopment are formed several plates of tendons, which are disposed horizontally and attach to the sides of the capsule, and have between them a very lax, soft, glossy, elastic membrane, also attached by short tendons to the surfaces of the above layers, and which, on the frog being cut perpendicularly through, and being pressed upon, projects from between these layers, and is like the caoutchouc, but of less resistance ; and in the natural state this elastic membrane appears perfectly white, but assumes with being kept a yellow appearance, and a yellowish semifluid oil then forms about it, which perhaps is the cause of its having been mistaken for actual masses or bags of yellow oil : when seized with the forceps, its membranous nature becomes apparent.

These transverse layers of ligament appear to give the foundation or principle to the structure of the internal frog ; and these ligaments or tendons, in approaching the point of the frog, converge, and are condensed into a stout tendon, holding this part to the anterior edge of the cavity before mentioned of the coffin-bone. These layers of tendon

ravages and pain. These we have cured by enlarging the incision through the frog : in the most desperate cases, the insertion of a seton quite through the frog on the side or anterior to the frog-stay, should not be resorted to till the antiseptic and topical measures have failed of the desired result, being alone sufficient.

If the natural coffin bone of the horse's foot be placed on a level flat surface, as a board or table, it will be observed to bear chiefly on the sides or quarters, and the inner heel and quarter will have a more flat and decided bearing than the opposite one, which is disposed more to project exteriorly, and the toe or front of the bone will hardly take any bearing; the reasons of which we have attempted to give formerly in describing the hoof.

In regard to the exact situation or place of this bone in the hoof, it may be proper to remark, it is removed to a greater distance from the frog-stay than the coronary ligament in passing posteriorly become more numerous and this structure at the frog-stay becomes doubled (existing on each side of it); and as these ligaments approach the base of the frog, they become more thin and flaccid, and are finally lost in these elastic parts of the heels by forming concentric layers of tendon with others coming from the extremities of the heels, and thus afford the rounded bulbs of the bifurcations of the frog.

The above singular apparatus of *constrated layers* of ligament appear admirably designed and provided to break the force of violent pressure against the more tender parts above described; and this they appear to do by each layer in succession receiving the force of the stroke and conveying it with diminished impetus to the next above, till it is finally lost or rendered incapable of doing injury. Towards the point of the frog these horizontal ligaments attach to a middle septum of tendon placed upright in the centre of it: and it appears necessary just to state that the capsule containing this apparatus is not, strictly speaking, in contact with the horn of the frog, since the membrane secreting the horn must ever be in that situation; and this *cornifacient* agent, on all occasions, is perhaps a continuation of and peculiar organization of the cuticle. We have observed also that a greater freedom of motion appears in the elastic organization of the heels, for a longitudinal rather than a lateral distention, determining the dilatation or extension, principally towards the base of the frog.

opening

opening next the ground than from the face being nearly on a level with the line which the front of the the front line of the hoof when weight or exertion it is diverging of the hoof. This bone receives, as

opening, its upper sur-
vity of the hoof;
nearly parallel to

all the weight or exertion of the animal, ~~which~~ through the more widely extended hoof, communicated to the ground without much solid resistance, or reaction to the bone; in consequence chiefly of the hoof being rendered yielding by the remarkable inflexion of its extremities, which can spring from the centre, to which they are directed, and afford by their lateral dilatation the non-resistance which in the feet of animals appears universally to obtain. Indeed we discover most clearly on investigation, that to every animal is given a share of elastic yielding in the foot, in order to destroy all jar and resistance reciprocally to the parts of the foot as to the body, and a change of form in the foot takes place according to the weight or exertion brought upon it. In the elephant, cartilaginous cushions, for this purpose, are seen disposed under the foot; and in the camel, oblong pads; in the ox, this non-resistance to the load is effected by a deep division of the foot to the fetlock joint, thus making of it two members, thereby giving a flexibility that answers the same end. In the horse, a single pad is seen, for of such nature is the frog; and this yielding property of the foot in him, and his tribe or family, is less perhaps than in any other family of quadrupeds, on account, it would appear, of the difficult combination of properties found with him, *viz.* an extraordinary degree of speed, with a large or heavy body, which to be impelled with effect required bases that should not be too yielding, by which the impulse had been diminished; and hence it is that this property has been nearly overlooked, and the foot treated by the smiths as though this necessary provision and property

perty had in him no exi
figure. Also th
resting upon it

ore than in a mass of wood of the same
truly suspended in the hoof than
clining position of the hoof, by
or placed over the bone, which
stic sutures to it; and this prodi-
internal surface by these sutures se-

cures it amply from the dangers of dislodgment.—Such appear the chief
circumstances that are worthy of notice in this bone.

On the same annexed plate is given a representation of the coffin-bone of a horse about eight or nine years old, and the difference of them will sufficiently exhibit the cause of our want of success in restoring the feet, and the great changes that shoeing produces: the general figure of the bone has suffered materially, and the organization of its surface has undergone almost perfect obliteration, that if there be any convenience or use in this construction it is now lost. The sides of the bone, from a wide crescent, have become oval, or of a parabolic figure, and from considerably sloping have become nearly upright; the exquisitely beautiful configuration we have termed the *Patiloba* is entirely lost, and the surface where it existed exhibits a collection of ragged cells and cavities, with sharpened edges, and which have been usually hitherto given for the natural appearance of this part of the bone. The physiologist well knows there can be no regeneration or restoration of a bone so altered.

Before we give the conclusions which these experiments seem to afford, we will subjoin a few remarks in explanation of some particulars which attended them. In the two first experiments it was observed that the hoof became incurvate or bent inwards in front, a circumstance we have since noticed very frequently with horses turned to grass without shoes, and appears to arise from the coffin-bone sinking under the weight and dragging the hoof after it, perhaps from the relaxation and softening the wet occasions to the hoof, and also especially

cially from the want of the usual support from the nails ; for the hoof, dilating under these circumstances, presses the bone from above, not having its usual embrace. The sinking-in of the hoof will be increased if artificial means are used. The lateral flatness of the sides, might arise either from the pressure of the nails, or by a rapid absorption of the sides of the bone itself ; for it would appear not improbable, that though the nails, acting by pressure against the sides of the bone, occasion its absorption, yet permit it only to proceed in a certain ratio, depending on their application ; but that after their removal, this disposition to absorption which they communicate to the foot, can perhaps proceed with greater rapidity, if the hoof be rendered flexible enough in this part to fall in and follow it, as was the case in this experiment.

In the experiment with the bay mare, the hoof, from being very much thinned, and naturally not very strong, the coffin-bone descended so as to bear on the sole, creating a fullness there, and bringing on a species of founder, that the experiment is not conclusive, as to the benefit that might be derived from turning out at this age : it may serve, however, as a useful warning not to resort to the application of similar measures with such kind of feet.

The experiment with *Tippoo* seems decisively to show that three years of liberty, or nearly so, of the foot, is insufficient to do away the effects of five years of shoeing, with all the assistance that can prudently be given it ; that is, if the shoes, as was his fate, have been applied at an early age. In the other experiments, the remarks accompanying them appear sufficient.

The important conclusion we draw from these experiments and facts, (which we wish to impress forcibly on the reader's attention,) is, that after the foot has been exposed a certain time to the operation of the iron, it becomes so much changed from its natural state, that it is safer and

more advisable for it to remain in the diminished and fixed condition to which it is reduced, than to expose, especially severe or coercive ones, to attempt any sudden or violent change to morbid affections, rather than that a continuance of it in this advance of the mischief, if it

very slow and unobtrusive, is to be preferred. Such appears the disclosure and unfolding of this mysterious matter, and which, though it may appear simple when explained, has been no small stumbling-block to many people both in and out of the profession.

The exposure of the foot a few days or weeks without shoes at grass, if the foot be strong, with a view merely to cool the foot, or remove any casual compression from a nail, is not intended to be included in the above caution ; but from further exposure, detrimental effects may be apprehended. In the course of our professional labours, we have often been called to feet lamed and disfigured by turning out, and have recommended, as speedily as possible, the re-application of the shoe, as the best resource, in order to bring back the fixed state of the foot ; but for a long period after, we have seen them go very crippling, and that accidents, and the sale of such have generally followed.

How long, after the shoe has been in use, we may turn out with good effect, remains to be ascertained, as this will depend upon the constitution of the feet ; for the variations of the hoof are very great, and very different effects will arise upon similarly constituted feet, from the circumstances of the period of life at which the shoeing commenced, and the manner of its being conducted. Certain it is, that few think of having recourse to these measures till serious inconvenience be felt ; and then it will be found, in a general way, too late to do much good ; that such means cannot certainly be resorted to too early.

Rather

. In concluding this Essay, we take the occasion to state, that a useful opportunity has been lately afforded of examining the horse's natural hoof and coffin-bone at the age of three years, through the obliging interference of our friends, who have been so good as to allow us to examine the hoofs and which has served to exhibit the changes which are wrought by the shoe, the excrescences or sutures of the hoof, which in this case were found thicker in substance, and in a remarkable degree broader, even to nearly double the width than in any hoofs we had before seen ; and, differently to what we had apprehended, these parts were of a clear white, and not of the reddish tinge they commonly have. The action of this mare, by those who broke her in, and by others who rode her, was particularly noticed as being free, extensive and firm, to an extraordinary degree beyond any horse they had ever recollected to have rode before; and their experience in this way was not inconsiderable, which must have been greatly contributed to, if not chiefly occasioned, by the full unfolding and perfect development of the organization of the foot.

I have now the satisfaction to see that many individuals, among whom are some of the nobility, touched by these considerations respecting the feet, have been induced to bring up their young horses in their parks and pastures without having recourse to the early application of the shoe ; and, under the experienced and skilful guidance of Mr. Bloxham and Mr. Field, veterinary surgeons to the 1st and 2d regiments of horse guards, there are some hundreds of their young growing horses at this time without shoes, trusting to the natural hoof, or to tips only at the toe, for what service they have to perform at this tender age ; and the happiest advantages, in respect to the strength and soundness of the feet, appear to attend it.

the ANCIENTS respecting

great necessity, protection which appears for the feet of horses used much on the road has naturally led to a belief, that without the aid of shoes the horse must have been almost useless; and, consequently, that some sort of shoes must have been had recourse to at a very early period of the world, and nearly, perhaps, or quite coeval with the first domestication and reduction of the horse to the services of mankind; and various passages have been adduced from the ancients in favour of these ideas,—some of the most remarkable of which we shall here briefly consider. As being one of the most ancient and most frequently brought forward on these occasions, we shall first advert to the expression of Homer, who, in describing the car of Neptune, uses the epithet “*brazen-footed*” to the horses attached to this car; whence many learned men have been led into the belief, that these horses were actually shod in shoes of brass*.

It is not from the language of poetry that it would be so proper to form conclusions, as figurative language may receive such different acceptations; but from the more plain prose writers, insucceeding times, who have expressly treated of the horse, we shall bring our proofs: we wish here merely to exhibit the causes which led, as we apprehend, to the mode of expression used by this noble poet.

If it be true that the ancients did not shoe, (of which sufficiently demonstrative proofs will appear hereafter,) then nothing would be more

* Ἐνθ' ἐλθὼν, ὑπ' ὅχεσφι τιτύσκετο χαλκοπόδ' ἵππῳ,
Ὠκυπέτα, χρυσείοισιν ἐθείρησιν κομόωντε.

Iliad. Lib. xiii. 24.

natural to a people so circumstanced, whose whole dependence was placed in the natural strength of the hoof, to extol this property, and hold it in higher repute than any other. We have seen the true intention of the writer, and we may render more evident by some examples from the ancients, having the same import. In the first place, we have the expression of the sacred prophet *Isaiah*, who, (in foretelling the downfall of Jerusalem,) uses these words, "Whose arrows are sharp, and all their bows bent; their horses' *Hoofs* shall be accounted like *Flint*, and their wheels like a whirlwind," *Chap. v. v. 28.*; alluding to the Roman armies, who but too dreadfully fulfilled this prophecy. It is to be remarked, that here the material selected for the metaphor or epithet of strength is harder than brass, and such as in no way could be made into shoes.

With other ancients may also be seen the same purpose of extolling the powers and durability of the hoof, as with Virgil, in the expression,

"————— *quatit solidungula campum;*"

or ————— *cavatque*

"*Tellurem, et scldo graviter sonat ungula cornu.*"—*Georg. lib. iii.* which expressions are not understood to their full extent, without being aware of the above circumstance: and in the words "*insultare solum,*" &c. the poet would impress us with the idea that no defect of the foot or fear of using the hoof existed, but the greatest firmness and strength. In the expression, "*molli fulta Pede,*" of Horace, we have the opposite condition of the foot portrayed, and these passages derive also a strength from these considerations.

Brass, or a kind of brass, was the chief metal in use in these early times of Homer, and from being the strongest substance they were acquainted with, it became very naturally with them the epithet of

strength, and is
languages ; as w

yn to this day, and familiar in most
brazen Towers, brazen Lungs,
have been more perfectly natu-
re the strength and durability of
character of his natural horse.

tness of language, can convey no
such meaning as *brazen-footed* ; for if the horses had been shod, "*brass
clad hoofs*" would have been the expression of so accurate a writer,
and not "*brazen-footed*," in which there appears a wide and just di-
stinction ; and in the succeeding line are given by the poet the other
natural beauties of the horse, of form and colour, with which to com-
bine such artifice would have been very uncouth, not to say im-
proper : and in other instances in which he introduces the horse in
this poem, (which are numerous) he employs, and not indirectly, the
term "*strong hoofed* *."

If the shoeing art was known in the days of Homer, there ap-
pears no reason why it should not have been continued in the succeed-
ing ages of this empire ; since the arts went on improving in the states
of Greece long after this period, and almost to the time of their being
subjected to the Roman power : and that so important an art as this
is, if it existed, could have been lost again, is not to be believed, by
a nation of such extraordinary ingenuity, having imminent occasion
for it in their almost continual warfare.

And the strength of the natural hoof to a people unacquainted with
shoeing, it is reasonable to believe, would, not only with their poets,
be a leading subject of exultation, but it is likely also this valuable
property with their generals would be a matter of some solicitude,
since the safety of the soldier would much depend upon it : and of
this there is sufficient evidence in the writings of Xenophon, a warrior

* Ἀΐψα δὲ Τυδείδην μέθεπε κρατερώνυχας ἵππους.—Il. lib. v. 329.

intimately

intimately acquainted with the horse ~~and the~~ management of him, according to the customs of his ~~country~~ ~~and~~ to believe, from the paucity of writings respecting ~~the~~ or Rome, that his instructions useful, that but little required to conductor of the cavalry movement their famous retreat from Persia, after the ~~death of~~ Cyrus the Younger, their leader, which is considered among the most extraordinary feats in the history of arms. His solicitude respecting the feet of horses is remarkable; and his directions in this respect, to preserve them hard and fit for service, as a matter of great curiosity, we subjoin, and we believe with fidelity, in respect to the intentions of the writer, not merely from our own researches on the feet, but by obtaining the aid of more learned friends respecting the import of the language itself.

“ In like manner, as food and exercise are sedulously to be administered to the horse, that his body should be strengthened, so the feet also require a careful attention; since these, from the wetness or smoothness of the stable shall be injured, even such as are the most perfectly formed. In order to prevent the moisture from lodging, they should have a descent; and that they should not be too smooth, stones should be imbedded by one another corresponding in size to the hoofs, for in such stable those horses that stand therein will have their feet strengthened. Next also, he that has the care of the horse should be mindful to lead him forth when he is to rub him down, as it is best to remove him from the crib after the mid-day feed, that he may have a better relish for the evening feed.

“ In order to render the yard or place outside the stable the best possible, and that it might tend to spread or dilate the feet, (*κατενυγναι*) a sufficient number, as four or five waggon-loads, of round stones, cut or docked round to the proper size, should be thrown down at random,

random, and so
not be so

or border of iron that they may
feet on these, the same purpose
be during a certain portion of
er, when they be rubbed down.
ould use his hoofs as when he is
feet will be strengthened by the

If the ancients used shoes, why should there be this solicitude and care about preserving the natural hoof?—had shoes been nailed to the feet, then there could have been no use or occasion for this ; nor could the stones have benefited them, or come in contact with them ; for their use appears to be, and indeed he confirms it, that their hardness should condense and harden the hoof, and by polishing and rendering smooth the bearing surface of the wall, render it less subject to fracture or wear, whilst the roundness of the hoof was maintained by the convexity of the stones fitting the concavity of the under surface of the foot.

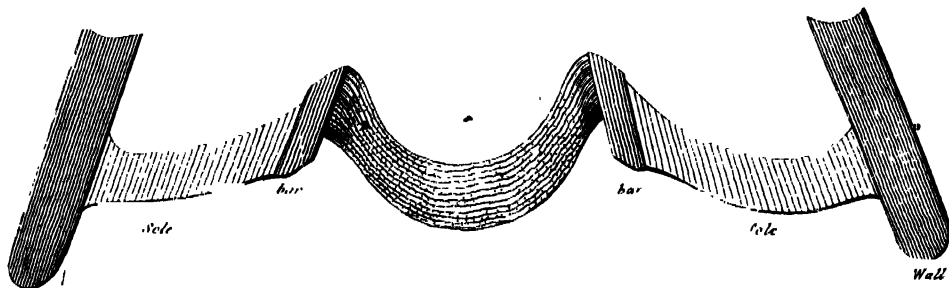
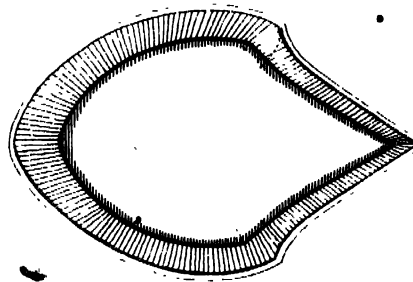
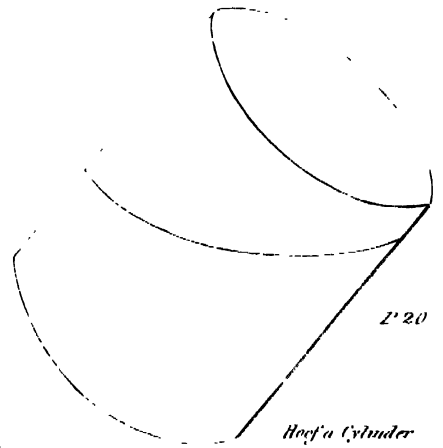
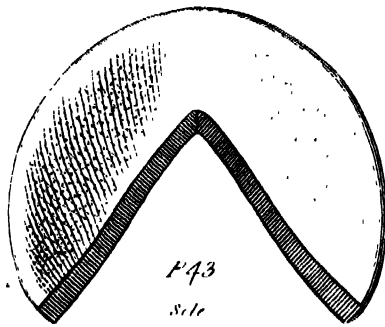
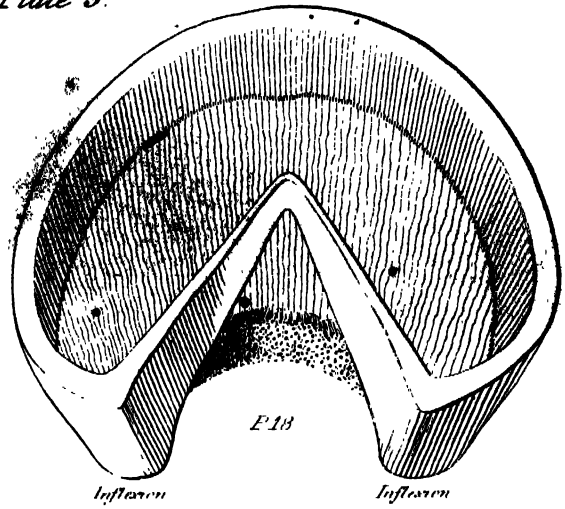
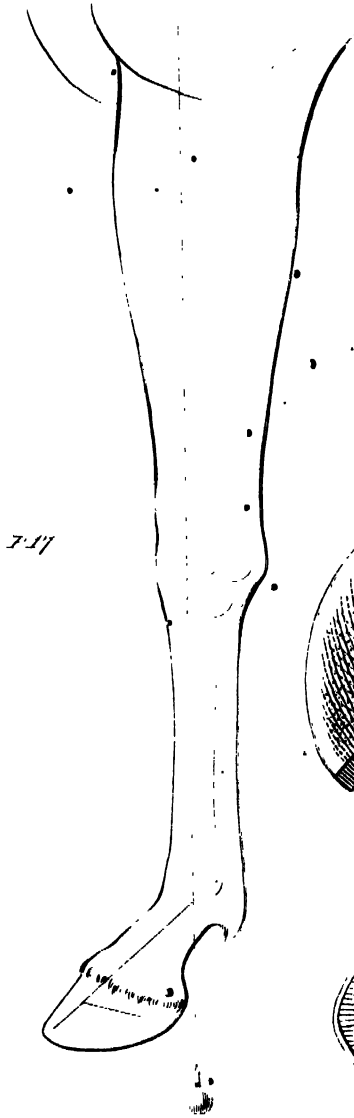
In another treatise of this ancient writer, in which he undertakes to point out the duties of a master of horse or cavalry, he thus delivers himself respecting the feet, enforcing and repeating his former directions. “ That the horse’s feet may be the strongest possible,—(if any one has a better or more perfect method let it suffice,)—if not, and I say it from experience, that you should throw down stones taken from the roads, of the weight of a $\mu\nu\tilde{\alpha}$, (a pound †) more or less ; and that the horse should stand on them whilst he is being rubbed down when he goes from the stable, for by walking on these stones, he will not cease to tread and paw upon them, either when he is rubbed down or when

* ΞΕΝΟΦΩΝΤΟΣ περὶ ἵππων. — Ed. Leunclavii, Francof. 1596, p. 938.

† A stone to fit the concavity of the hoof would weigh many pounds, which seems to point out a different weight than our pound English, though it is usual so to translate it.

Direction of Pressure

Plate 9.



he is curried ; and he who tries this will believe what I say, and will find his horse's hoofs made round.

It is hardly necessary to observe that this useful and elegant writer lived about five hundred years before the Christian era, and consequently near the period of the Grecian states.

Though it was not the custom with the ancients to shoe their horse's feet, yet they appear at times to have had recourse in difficulties to artificial defence, and which was probably of the most simple kind, and much after the same way they defended their own feet.

The *Ἐμβатаὶ* (*Embatai*) have been conjectured by some to have been used by the ancients for the defence of the feet of their horses. Xenophon makes mention of these towards the conclusion of his book "*De Re Equestri*;" but describes them merely as coverings or defences to the legs of the soldiers ; though afterwards he adds, that, by making them to pass under the feet they may serve for shoes also † : that there does not appear any direct proof, that we are yet acquainted with, of these being actually employed for the horse's feet, though it was but perfectly natural that by similar means they should attach their defences to the horse's feet ; and Xenophon directs them to be made of the same leather as the shoes are made of.

The *Καρβατίαι*, *Curbatinai*, in like manner, have been mentioned also as the defences of the ancients for the horse's feet, and these appear to have been much of the same nature as the former ; but were used chiefly by the rustics, and were more coarsely constructed ; of rough cloth perhaps, or ox hide, or untanned leather : and that these

* ΞΕΝΟΦΩΝΤΟΣ Ἱππάρχικος.—Ed. Leunclav. Francof. 1596, p. 956.

† Εἰ ἐμβαταὶ γένοιτο σκύτους ἐξ οἷου περ αἱ κρηπίδες ποιούνται, οὕτω γὰρ ἂν ἅμα ὄπλον τὸ κνήμαϊς, καὶ ποσὶν ὑποδήματ' ἂν εἴη.—*Xenophon de Re Equestri*. Ed. Leunclav. p. 953.

From the word *embatai* probably comes the French *emboiter*, and passing through the languages of the Netherlands to us, it becomes the familiar English word *boots*.

were employed for their animals also appears from what Aristotle says of the camel, that, "in the camels, their feet were subject to become tender, and were cured with the *karbatinai**."

Some time afterwards, veterinary writers of the horses of the Roman armies for Constantinople; and the collection of the writers and friends, is in a remarkable manner still preserved to us; and these men, it is likely, were the first that ever were exclusively employed in considering the diseases of this animal: and in a chapter of one of these, which appears to have been hitherto overlooked, we have some intimation respecting the defences of the feet, and which not only exposes the name they went by, but also the inconveniences they were attended with, and the remedies they employed. As the book is rare, and the matter new and interesting, we subjoin the original passage, with the Latin translation of it, as given by Ruellius, and the following version in English:

"*APSYRTUS, concerning the injuries from foot defences, or the fastenings of the same.*
Chapter 107.

"It happens that the legs of the horse, (or rather shanks, *μεσοκύνια*, *mesocynia*†,) from the foot shackles, (*ἵπποπέδης*, *ippopedes*,) or its fastenings by the thong or cord, become injured, so that the skin falls down, (is destroyed) and the tendons of the fetlocks are laid bare. There is danger of this being fatal if it happen to both joints. It is proper, therefore, in the first place, to apply wine, vinegar, or brine and vinegar; next, to use the *lipara* and soft applications of white plaisters; and, to complete the cure, of ceruss one part, of ammoniacum half a part, of myrtle-berries a sufficient quantity; then tri-

* Aristot. Hist. Anim. Lib. 2. Edit. Loemar. 1597, p. 850.

† From various passages in the Greek veterinary writers it is clear that *Mesocynia* also included the pastern bone and that part of the coronet bone which is above the hoof. *Apsyrt. lib. 1. cap. NB &c.*

turating the ammoniacum, mixed with the ceruss, pour upon them the myrtle, and use it*.”

Apsyrtus lived in the time of the Ptolemies, we learn from Suidas, and also by his own confession, he had been employed with the army on the Danube. The inconveniences he mentions were probably the true reason we need not wonder at them, but appear chiefly to have had recourse to them in case of necessity, from abrasion of the roads and great tenderness; and hence, for long journeys, mules and asses were so much more employed, whose tough hoofs and less sensible feet could better endure the roads; though it is likely their paved causeways were highly favourable to their horses, &c. going without shoes, being in effect, and also in appearance, except that the stones were thicker and not so large, like the flag-stone pavements of the present day; the naked hoofs, if kept clean, upon such a surface would not be much torn or rubbed, or nearly so much as on a road made of loose gravel.

* Ἀψύρτης περὶ τῶν ἀπὸ πέδης ἢ δεσμοῦ τινὸς τελασμένων.—Κεφαλ. ρζ’.

Συμβαίνει ἀδικηθῆναι τὰ μεσοκύνια ἐκ τῆς ἱπποπέδης, ἢ δεσμοῦ τινὸς ἀπὸ ἱμάντος, ἢ σχοινίου, καὶ ἡ βύρσα ἀποπίπτει, καὶ ψιρὰ γίνεται τὰ τῷ κυνόπλῳ νευρία. κίνδυνον ἔν ἐξει διαφωνῆσαι εἰ ἐν ἀνθρώποις τοῦτο γέγονεν. δεῖ ἔν πρώτῳ ὑποσύρειν οἶνω, ἢ ὄξει, ἢ ὀξάλμῃ. ἔπειτα ταῖς λιπαραῖς, καὶ τῶν λευκίων ἐμπλαστῶν ταῖς τριφεραῖς χρῆσθαι. ἀκρῶς δὲ ποιεῖ τὸ τῷ ψιμμουθίου μέρος ἐν ἀμμωνιακῇ τὸ ἥμισυ, μυρσίνης τὸ ἄρκοιν. λεάνας οὖν ἐν ὕδατι τὸ ἀμμωνιακὸν μίξον τῷ ψιμμουθίῳ παραχέων τὸ μύρσιον, καὶ χεῖ.—*Scrip. Græc. Veterin.* p. 256. *Ed. Basil.* 1537.

Apsyrtus iis qui compedibus aut vinculis collisi vitiantur. Cap. ciii.

Usvenit ut suffragines, quas mesocynia vocant, tricis, pedicis, vinculisque quibusdam loro vel fune districtis plerunque lacescantur, quibus corium procidit, sic ut nervuli hujusce partis aperiatur, ac nudipateant: id quod vitæ discrimen advertit, præsertim si in utroque flexu articulorum evenierit. In primis igitur opus est vino vel aceto aut muria substringere, dein lipara et alborum emplastrorum tripheris vitiatam partem alere. Cæterum cerusæ pars una, ammoniaci dimidia portio, myrti quod esse satis videbitur, præsentis sunt auxilio: ammoniacum itaque teritur in aqua, et cerusæ permiscetur, et baccæ myrti profunduntur.—*Ruel. Hippiatr.* Lib. 2, p. 100.

The

The decline of the Roman Empire, soon after this period, and the obscurity which followed, have rendered the veterinary art, as an exclusive profession, to be almost entirely forgotten. The iron nailed shoe being brought into use, the smiths occupied with this work, the horse, under the title of *Ferrarius*, the length this was corrupted into the Latin *ferrum*, iron.

That the ancients fastened their horses' feet in this simple manner there can be little doubt and, as a sort of collateral confirmation of it, there is to be seen, in the collection of pastes or impressions from engraved stones of the ancients now preserved in the British Museum, and formerly belonging to Baron Stosch, the representation of a soldier in the act of applying a defence of this description to the horse's leg, at least the attitude he is in makes it probable that such is his object; he appears kneeling down in front of the horse, with his right hand grasping the off leg, while another soldier standing by is holding up the other leg, bent backwards to the elbow, assisting him. And the above quotation from Apsyrtus affords indubitable proof that they applied their bands or ties about the shank, though it is probable about the fetlock and coronets also. Beringer imagines this soldier is applying the shoe of Broom twigs, the *Sparteum opus* of the Romans, which we should doubt very much, for the reasons that will be seen on a further investigation of the nature of this sort of shoe; it is more probable that he is fastening on the *hippopedes* by the ties or thongs above alluded to by Apsyrtus.

To these leather socks for the feet of their horses, and especially mules, to render them more durable, they occasionally affixed plates of metal; sometimes iron was employed for this purpose, as these lines of Catullus sufficiently exhibit:

“*Et supinum animum in gravi derelinquere Cano,
Ferreum ut Soleam tenaci in voragine Mula.*”—Cat. xvii. 23.

For

For mules were very much used for draft, and especially where longer journeys could suit them to ride, both on account of in horses' feet; and it was no unusual especially for state purposes. But that the shoes of Poppæa's mules made of silver, and some, it appears, thongs used for fastening them were probably also richly ornamented, which circumstances will sufficiently explain any fairly quoted passages of the ancients: for those translators who have believed that the shoeing of these times was as we now shoe, have taken liberties with their originals that could not be justified: we have an instance of this in the translation of Appianus, by the learned H. Stephanus, the words *Solearum inopia* are introduced in his translation, for which there is not the smallest authority in the text*: and the commentators of Suetonius, under the Life of Vespasian, have taken the same course; from which Schaeffer in his truly learned and useful work "*De Re Vehiculari Veterum*," appears to have been led into error: on examining the passage he quotes as the words of Suetonius, we find he has mingled with it the words of the commentary, to make his proofs more clear†: indeed the circumstance of the muleteer of

* Τοῖς δ' ἵπποις ἀχρεῖοις οἷότες ὄντας καὶ ἀσθένεις δι' ἀτροφίαν καὶ χωλεύοντας ἐξ ὑποπίψης, ἐς Βιθυνίαν περιέπεμπεν. Equos vero tunc inutiles et infirmos ob inedia, claudicantesque *Solearum inopia*, detritis ungulis aversis ab Hoste Itineribus misit in Bithyniam.—*Appianus De Bello Mithridatico*, Ed. Steph. 1592, p. 221.

† Ut testatur Suetonius in Vespasiano, qui frequenter solebat lectica deferri in villam suam Cutiliam, sed a mulis quoniam quadraginta milliarum intervallo abesset Roma: Hinc qui lecticam ejus deferbat, sollicitatoris cujusdam donis corruptus, è mulis retentus fingeret se aptaturum *Soleam ferream* pedi unius ex mulis, tempus dabat supplici ad porrigendum Imperatori libellum.—*Schaeffer De Re Vehiculari. Suetonius Imp. Vespasiani vit. De Facetis*, p. 120.

the emperor gave him a large sum of money on the shoes, and detaining the muleteer, who had been bribed the muleteer to do so, would show that they were not. In these more experienced days the emperor would have about him the best of the smiths: that this, like the modern shoe, construed, makes against rather than for their supposition.

In this review of the measures of defence with the ancients, we cannot altogether pass by the term *Hippocrepis*, (*ἵπποκρηπίς*,) though of doubtful origin; and whether in use with the ancients or not, we are unacquainted: if analysed, it would strictly mean the *leather horse-shoe* which was the real shoe of those times, being formed of *hippos*, a horse, and *crepis*, *corium*, tanned leather. If the term *Hippocrepis* is merely an invention of the botanists, there appears to be a great incongruity in their application of it; for the plant, (a sort of trefoil or vetch,) which they have called after this name, and which has a pod or seed-vessel, of a crescent shape, and corresponding exactly in figure to the modern nailed horse-shoe, is, unfortunately, no way like the sock of leather which covered the whole under part of the foot with the ancients.

Not till we arrived at this point of our labours, and the preceding part of the Essay had been printed, did we become acquainted with the valuable dissertation on this subject of ancient shoeing by professor Beckman, who has, with extraordinary pains, brought into one view nearly all the passages that, from time to time, have been advanced by different writers on this inquiry, and to which he appears to have also made additions from his own stores; and he is led to much

* The following is the passage from Suetonius: *Mulionem in itinere quodam suspicatus ad calciandas mulas desilisse, ut adeunti litigatori spatium moramque præberet: interrogavit quanti calciasset: pactusque est lucri partem.*

the same conclusions respecting it. Had we known, indeed, that any treatise, so ~~separately~~ ^{originally} printed upon this subject, we probably should have deemed it being necessary to the main satisfaction to observe that the reasons we have adduced, have it will tend to advance and render ancients on this frequent topic of discourse of his extraordinary labours to enrich in some respects the remaining part of our Essay. The above treatise* is referred to by Dr. Parr, in a very ingenious and useful note on the word *opertos*, in the second Satire of Francis's Horace; and was obligingly pointed out by the learned and ingenious printer of this work.

Another defence, or sort of shoe, as it is apprehended, in use with the ancients, and which is the last we shall have to examine is formed of the slender twigs of the broom; called *σπαργαν* and *σπαργον* by the Greeks, and *spartet*, *sparcea*, or *sparteum opus* by the Romans: there is much reason to doubt this ever being employed for the purpose of protecting the foot against the roads in the way of a shoe. We shall first select from the ancients a few passages where they direct its use, and then form our conclusions from what they suggest. *Theomnestus*, who was one of the early veterinarians before spoken of as belonging to the eastern armies of Constantinople, recommends its use in the following way for a case of excessive *abrasion of the hoofs* (which affords at the same time a tolerable proof how little they had recourse to shoes). He says, "if a horse is much torn in the hoofs by travelling, and then neglected, he becomes feverish, and is soon destroyed by the fever, unless timely prevented by help. You must therefore make use of warm water, in which the root of *althæa* or wild mallows has been

* History of Discoveries and Inventions, 3 vols. 8vo. London, 1797, vol. 2. p. 286.

boiled,

boiled, to foment ~~the~~ if becomes cleaned and softened ;
or fragments, and lay bare in
to have immediately in readi-
cords and coarse rough cloths,
other coarse stuffing, with gar-
ie by one or individually ready
as to fix them by ties round the

hoofs: if it should ~~be~~, let him be blooded from the coronet; let him stand in a warm air, where there is sunshine, or let fire be kindled in the winter time, and underspread him with dry dung, that he may not walk on what is hard. The feet may suffer in this way without being much inflamed; let him be attended eight days, and let him stand in-doors on dung, and his water be brought him, that his hoof may not by walking be torn asunder, but may grow, being nourished ~~by~~ that rises out of the dung*."—The twigs of the spartium are here recommended to be employed in their simple state as cords, to bind on the dressings, and were probably paced under the foot, then platted up the sides, and made to meet above round the coronet. The next example we take from Columella, who lived two centuries, perhaps, earlier than the preceding writer, and in or near the Augustan age. For oxen that become tender or lame he directs, "if the lameness is downwards or in the hoofs, that you should make a slight opening between the claws with a knife, afterwards apply soft rags or cloth soaked in salt and vinegar; then let the part be covered with the *Spartean shoe* (*solea Spartea*), and let there be great caution that no wet come near it, and that the stable be kept dry†."

* Script. Græc. Veterin. p. 254.

† At si jam in ungulis eat, inter duos ungues cultello leviter aperies, postea linamenta sale atque aceto imbuta applicantur, ac *solea Spartea* pes induitur, maximeque datur operâ ne in aquam pedem mittat et siccè stabuletur.—*Columella*, Ed. Manh. 2, p. 27.

Columella, in the same chapter, says that the foot be bound round with the broom*." A flat plate of some length, of rushes or broom, would be a [redacted] ing this, and is perhaps w[redacted]

The word *solea* would seem to convey the same idea; that which I perused these writers, led and used for defence also; but I now believe our own customs in these respects lead us to apprehend too much and to form too serious notions of their expressions in this respect. All they meant probably by *solea*, in this case, was a lattice work of the broom to go beneath the foot, and the loose ends of which were brought to tie round the coronet, being twisted or platted up the sides of the hoof.

Vegetius was a considerably later writer than either of the foregoing, and the last of the ancients who wrote on these subjects; and he has frequently mentioned this sort of application: "if the hoof becomes injured (abraded) bleed the foot, and when it has bled sufficiently you are to rub the part with salt, and afterwards anoint with vinegar and oil, and dress with soft cloths; using the shoe of *sparteae*, that after the humours are evacuated it may be repaired †." Again, this writer, in sprains or injuries of the limbs, advises, among other things, that when the horse is able to walk he shall be taken to the river, the

* Si sanguis in inferiore parte ungulae est, extrema pars ipsius unguis ad vivum rescatur, et ita emittitur, ac linamentis pes involutus *sparteae* munitur.—Columella, Ed. Manh. 2, p. 27.

† Cum sufficienter effluerit cruor, sale perfricabis, postea aceto et oleo inunges, et linteolis munies diligenter. *Sparciam* calciare curabis, ut post egestionem humorum ungula reparetur.—Veget. De Arte Veterin. p. 43.

sea, or a fish-pond, and swim about; and the foot should be bound up.

The application of it, and defence, would soon be worn through, or if brought in contact with the ground, its inadequacy to defence will be as uselessness as a shoe will appear

This *spartum* or *sparte* used by the ancients was not the common broom of our heaths in England, of which the small green brooms are made and sold about the streets, which appear to be of too shrubby and knotty a nature for this purpose, but the large yellow flowering plant we often see cultivated in gardens, the *Spartium juncum* of Linnaeus, or *Spanish broom*, a native every where of the south of Europe: its stems may be observed to send forth numerous cylindrical rush-like twigs, which were the parts employed on these occasions: being tough, they might individually be used as strings, or, platted, and formed into flat or rounded braids or cords, were exceedingly well adapted for keeping on the dressings of the horse's foot, being pliant and cool; and perhaps presenting every where in abundance in these regions, by nature or cultivation. The fibres of these twigs broken up and detached, and again artificially combined, would readily form ropes or cords of any size; and it may also be shown, that these expressions, were almost or quite synonymous, to cords and cordage with us, as Homer, in describing the sailing of the Grecian fleet, says the *sparta*,

* Et cum ambulaverit, mittatur in piscinam vel flumen aut mare, uti natet, cum *sparte* et pannis vincto pedē.—*Veg. De Arte Veterin.* p. 134.

Simulque in agendo itinere damnum è diurno detritum majus sit, quam ut per noctis quietem tantum renasci possit.—*Ruellius Scrip. Græc. Lib. 2, fol. 99, fa. 2.*

the *Spartum* of the Romans

† Vis magna Sparti ad rem nauticam congesta ab Asdrubale.—*Livius*.

2

considered in the same manner, not merely as convenient bands

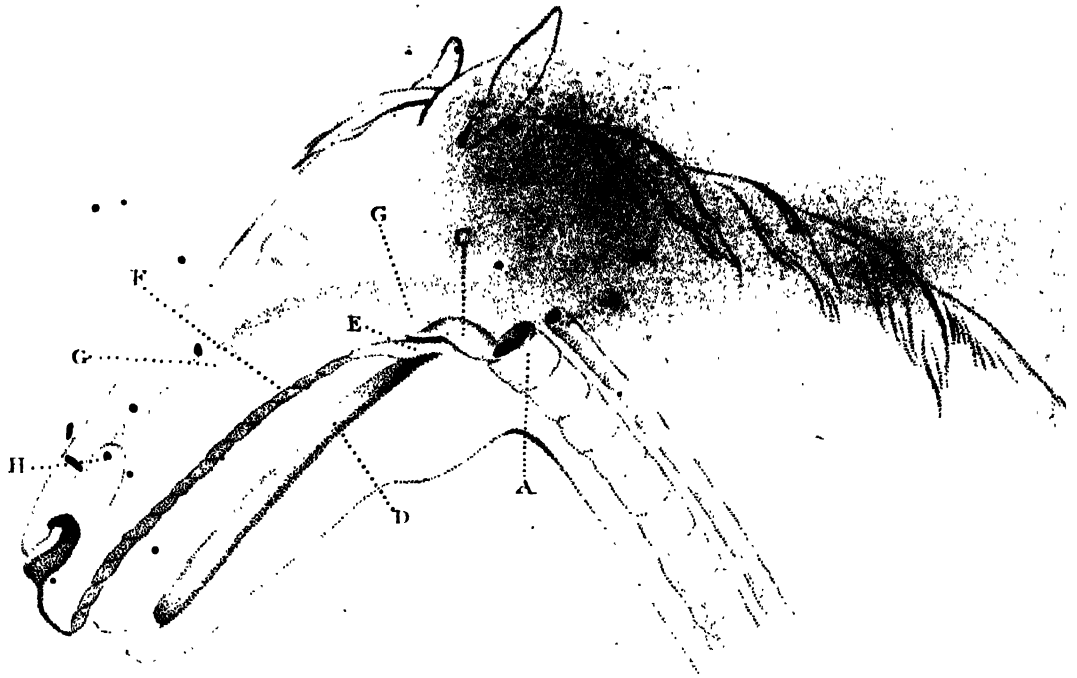
for the feet, but as articles of acquaintance with; and if further, if the Romans did not know any thing of the art of shoeing, as is prohibited in the works of the writers of the occasion for horses and mules. The writers of the villas, were often led to speak of the art of shoeing as comprehensive and elegant of these writers, and was even known near the age of Augustus, gives the following directions and advice respecting the stables of the villa: "That the master should frequently go into his stable, and should especially notice if the paving of the stalls rise sufficiently in the middle, and that they are not made of soft wood, as frequently, through want of knowledge or negligence, was liable to happen; but that they be made of *hard oak timber*, compacted together, which sort of wood hardens the *hoofs of horses like stones**." He observes in another place, that in your choice of a horse select such as have *hard hoofs*, upright, (opposed to flat,) hollow beneath, and round, with coronets of a middle size†.

Varro also, as well as Columella, lived about the same period in which those authors wrote, whose words are quoted in proof of ancient shoeing. In recommending the choice of a horse, Varro says, "Prefer one with straight limbs, joints rounded and even, but not too large nor bending inwards, with *hard hoofs*‡;" a quality so continually insisted upon

* Diligens itaque dominus stabulum frequenter intrabit, et primum dabit operam, ut stratus pontilis emineat, ipsumque sit non ex mollibus lignis, sicut frequenter per imperitiam vel negligentiam evenit, sed roboris vivacis duritia et soliditate compactum; nam hoc genus ligni equorum ungulas ad saxorum instar obdurat.—*Col. Lib. 1, Ed. Mauh.* p. 73.

† Duris ungulis et altis, et concavis rotundisque, quibus coronæ mediocres superpositæ sunt.—*Colum. Lib. vi. p. 50*, "Ut ungulas duret sitque postea longis itineribus habilis." p. 63.

‡ Cruribus rectis et equalibus, genibus rotundis, nec magnis nec introrsus spectantibus, *ungulis duris*.—*Varro, Lib. 2, ch. vii. p. 306. Ed. Gesneri.*



- A. Opening of the Trachea or Windpipe
 B. Oesophagus or Gullet
 C. Epiglottis
 D. Tongue
 E. Hard Palate
 F. Palate or Roof of the Mouth.
 G. Vocal Papillae
 H. Truncation of the inferior Ventril

Robt. A. Lawrence Del.

M. Houghton Sculp.

in these writers, but which none could particularly desire.

The frequent complaints of the feet sustained from detritum shoeing. Among other things grow as fast as possible, and not have taken from one of the Greeks who more fully gives it the merit of had lost by abrasion in the day's journey.

The scriptural expressions also plainly indicate the fact: "Then were the horses' *hoofs broken* by the means of the prancings of their mighty ones†:"—"With his horses' *hoofs* he shall tread down thy streets."

The sculptured figures of their horses, also, every where without shoes, come in confirmation of the truth of this.

Vegetius was the last or latest of the writers among the ancients who treated expressly on horses; and from his work secure conclusions may be drawn respecting the ancient usages with these animals than any other. He has diligently brought together nearly all the affections and diseases, and casualties of the horse, their different breeds then in use, and qualities; yet has this writer not once alluded to an iron nailed shoe, or touched upon one of the abuses or accidents that such practice is almost necessarily encumbered with; which by reasonable men will be admitted, we believe, as improbable, or rather utterly impossible for him to have passed over in silence had such then been known. In his work *De Re Militari*, so much ad-

* Animalium ungulæ asperitate ac longitudine itinerum deteruntur et impediunt incessum.—*Vegetius*, Lib. i. cap. 56, p. 86.

Unguento etiam conficiendi sunt quæ ungulæ nutriuntur, et medicaminis beneficio subcrescat quod itinere attiverat injuria.—*Id.* ib.

† Judges, chap. v. ver. 22.

inured and quondam, in the brevity and perspicuity, he enumerated the various uses of iron in an army forge, (Lib. ii. cap. 25.) in a class of artificers, or the like. It is pretty well ascertained, that the reign of the emperor Valentinian was the first ; at which period it may be conjectured that shoeing with nails was entirely unknown.

On the Origin of Shoeing.—FROM what has been stated of the ancients not having been acquainted with our mode of shoeing, the reader may have some desire of being informed of what has been hitherto discovered respecting the commencement of this art, and of its inventor. Of these particulars but little is at present known ; nor will it probably ever be otherwise, as this mode of shoeing took place in the obscure periods of the decline of the Roman power. It was perhaps first brought into use by some of the barbarous nations which overran that empire. The Goths were a nation more especially likely to introduce such an art, because, like the rest of the northern nations, they excelled in working iron. At its commencement, it was probably merely a temporary resource in a case of great necessity and distress ; a breach, for example, made in the hoof was covered by an expert workman nailing a piece of iron over it : this succeeding in remedying the defect would induce the repetition of it in other cases ; and growing more expert and bold by use, the artificer afterwards might extend his iron to the whole foot, and at length even apply it where no evil existed. He who first began the practice, whoever he may have been, little suspected he was laying the foundation of more animal suffering than ever it fell to the lot of one man to originate. Not only have countless myriads of feet, during the several centuries that this practice has been in use, been injured with suffering,

ing, which, in a greater or less degree, attend such changes as we have pointed out, and which are to endure, for offences in general, together with the severe blinding, the want of stability of feet,

In the early periods of the world, in the former part of this Essay, the animal that they could not find feet, as it prescribed bounds, and limited the use of him: though he might suffer at times in a less degree, from his feet becoming tender, and from the abrasion of his hoofs, yet oppressive and excessive use was prevented by it. Notwithstanding that these ancient nations were barbarous to one another, in respect to their animals there appeared traits of more lenity than among the moderns: this perhaps may in some degree be accounted for from the unnatural state to which the horse is brought by the effects of the art, about which there has ever been admitted by the public something of a mysterious nature; and in connection with imagined secrets and practices of the Turf, this notion has been strengthened and cherished: its consequences in respect to the animal, and to the public, it would not be difficult to trace, and exhibit as disadvantageous to both. That real difficulties do exist we have already demonstrated; that these obscure feelings or apprehensions were not altogether without foundation; but where the difficulty lay was not before understood. The lower orders of men, upon whom the care of our horses must devolve, have taken advantage of this state of things, and have kept up these notions of difficulty and mystery. Of this we may at all times have an example; for, if a remonstrance is made by the reasonable or humane man against the brutality too often practised, a ready bulwark is found in the barren expression of "*what do you know about horses?*" Though perhaps
young.

young, and but [redacted] yet, as his first lesson, he has learned this [redacted] And this is extended [redacted] for instance, a bullock is being [redacted] only intended to be brought [redacted] reasonable man interfere in his be- [redacted] necessity or propriety of the con- [redacted] *the matter?*” is the ready provided [redacted] house is then opened upon him. If a sheep, that is simply to be driven to or from the market, has an eye thrust out with a pike, or his leg broken, to help him along, and a reasonable man interfere, “*what do you know about sheep?*” is the ready screen for those acts. This apprehension of mysterious language we see extends further than at first appears, and is accompanied with such a degree of fear among the public, that men are intimidated from calling these practices in question. Such abuses can only be removed by pursuing one course; and that is by extending a better and real knowledge, and promoting the investigation of these evils: the magic of these mysteries will then soon disappear, and a brighter day shine upon those who are now suffering severely from its encouragement. Led away further than we intended by these considerations, we return again to the subject of shooing. The earliest nailed shoe of which there is any record was found at Tournay in Flanders, buried in the coffin of Childeric king of France, who died in the year 481. A particular account is given by Chifletius of the opening of this tomb*; and he states that the holes of this shoe fell to pieces on being handled. It is copied by Montfaucon† in his *Antiquities*, and from its size one might have suspected its having belonged to some favourite

* Anastasis Childerici, Francorum Regis, sive Thesaurus sepulchralis Tornaci Nerviorum effossus. Auct. J. J. Chifletius. Antwerpiae 1655. p. 224.

† Monumens de la Monarchie Francoise, Paris 1729. 4 vol. fol. 1. p. 16. t. 6.

mule. The holes, however, are not the result of its being a shoe of the nailed kind; for the holes are not made for the preservation of their sockets, but are made for the purpose of perforated, in order to fix them. The uncertainty remains respecting the nature of the shoe.

The first clear intimation of the use of the shoe is in the reign of the emperor Leo the Isaurian, mentioned in the *Tactica* of the Emperor Constantine VII. Beckman; mentioned in the *Tactica* of the Emperor Constantine VII. of this king; *πίδικλα, σιληναῖα σίδηρα μετὰ ἀγκυρῶν*; *lunatica cum clavis eorum*; "halters for fastening horses, with crescent-shaped irons and their nails." That this expression relates to the modern shoe there can be no doubt; and the same expression, on the same occasion, occurs again in the tenth century, in the reign of one of the Constantines; and it is used in the twelfth century by Eustathius in his commentaries on Homer, who was led to apprehend that Homer, in those expressions which we have noticed, alluded to this kind of shoe: his remarks are made on the 152d line of the eleventh book of the *Iliad*.

Pere Daniel the historian (*Histoire de France*) gives us to understand that in the ninth century horses were not always shod, but only in time of frost, or on particular occasions.

With William the Conqueror the art of shoeing appears to have come into England: he gave to Simon St. Liz, a Norman, the town of Northampton and the hundred of Falkley, then valued at 40*l.* per annum, to provide shoes for his horses*; and Henry De Ferrers, who also came with him, he appointed as superintendant of the shoers, whose descendants, the earls of Ferrers, had six horse shoes in the quartering of their arms†. At Oakham, in Rutlandshire, the seat of

* *Archæologia* 1775, vol. iii. p. 39.

† *Brook's Catalogue of Errors*, p. 65.

this family, &c. A canonical custom long prevailed: the place, for him to forfeit to redeem it by a fine; and the place, was fixed upon the consequence of this custom with numerous shoes, some of which, &c.

These shoes existed also in the Leverian Museum, which I examined before the sale and dispersion of that collection, but should apprehend the oldest of these could not have been more than 300 years; the absurd forms and unwieldy bulk of some of them served only to exhibit what wild conceits men may fall into who know not the laws or proper limits of their own art.

We conclude for the present our remarks on the art of shoeing, the most obscure and difficult branch of the veterinary profession, as will be readily perceived by those who have heretofore much investigated it. That which was obscure and difficult to be comprehended it is hoped will now be seen more distinctly, and be more easily understood. The studious veterinarian may obtain an insight into the nature of those cases which are continually presented to him, though deriving little advantage from his exertions: and whether any means may hereafter be devised for removing these evils, to have arrived at a knowledge of the consequences of the present system of managing the feet of horses is, it must be admitted, to have made no inconsiderable advancement in the science. We have, however, a well founded confidence that relief from these evils is not unattainable; by an attention to the foot in the early period of life the removal of a large share of it is obviously practicable; and these ends may be further promoted by measures we shall hereafter point out. If the language of this treatise should have appeared different from that which has been usually employed on these subjects, the difference we may ob-

serve has originated more from the former than from the latter, and formerly used being obscure and unobserved, an alteration became necessary, and many alterations have been placed in the text, and others which have before been of great importance have been brought to light by the industrious research has furnished, and the new basis for the art; on which it may be elevated advantageously, and rise in its importance with the public as in real utility. An impenetrable barrier to the progress of this kind of knowledge, has been these obscure affections of the feet; and it may serve as an apology for any obscurities that may appear, that it has been difficult to give clearness to things in their nature obscure, or to find language suitably to express them. A republication of the work would afford some opportunity of advantageous alteration in this respect, as also in the arrangement of the matter as it now lies wholly before me. It may be also reasonably expected, that as the real knowledge of this art advances, more lenient measures in the treatment of the animal will attend it, and the violence and cruelty and ignorant conceits necessarily accompanying such a vitiated state of things, will be removed; and a humane and mild treatment will also, we believe, be ultimately found inseparably connected with the truest and best interests of mankind in the use of the horse.

FINIS.

ERRATUM.

For "the naked hoof if kept clean upon such a surface," read "the naked hoof upon such a surface if kept clean," p 131

